

STRATEGIC RENEWAL: LEARNING, UNLEARNING,
AND ORGANIZATIONAL WISDOM

A Dissertation

by

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ABSTRACT

Sustaining long-term viability requires that firms undergo many changes throughout their lifecycles. When a firm recognizes that its current strategy is unsatisfactory, it may engage in strategic renewal—a process of redirecting the firm’s strategic intent and capabilities. But *what* exactly is being renewed and *how* does a firm go about this? I argue that strategic renewal involves renewing organizational knowledge through the mechanisms of technological innovation as firms alter their path dependence. In a series of three studies, my dissertation encompasses investigations of how organizational learning, unlearning, and wisdom relate to the process of strategic renewal. Study 1 proposes that organizational learning precedes strategic renewal as firms explore new knowledge while balancing internal exploitation of current knowledge and the external adoption of its current technologies. Study 2 introduces a process of unlearning as firms must shed obsolete or misleading knowledge in order to substantially change their knowledge bases for strategic renewal. Study 3 suggests that the strategic renewal process of changing knowledge through innovation results in achieving organizational wisdom.

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CHAPTER I

INTRODUCTION

Strategic renewal was introduced in organizational management literature as a variant of strategic change. Huff, Huff, and Thomas (1992) recognized this shift in theory from a growing research emphasis on the evolution and longevity of firms—firms must not only change in order to succeed, but they must also renew themselves continuously in order to achieve long-term performance goals and extend their potential for sustained viability. In this perspective, we may view strategic renewal as encompassing multiple changes in strategy over the lifetime of a firm or organization. While organizational management researchers have extended theory about strategic renewal for nearly three decades, we have yet to gain clarity and consensus of precursors, mechanisms, and consequences. In their 2018 review of strategic renewal literature, Schmitt, Raisch, and Volberda find that theories of learning or resources precede renewal, renewal (micro)processes may be induced or autonomous, and renewal results in either co-alignment or co-creation with the organization's environment.

I agree with these classifications of the literature, and I find that the most developed area of study is the relationship between strategic renewal and organizational learning, exemplifying how insights are transformed into actions when changing the strategic direction of an organization (e.g., Crossan & Berdrow, 2003; Crossan, Lane, & White, 1999; Crossan, Maurer, & White, 2011; Jones & Macpherson, 2006; Pettit &

Crossan, 2020). Scholars have also conducted a multitude of qualitative assessments to provide evidence of strategic renewal microprocesses and macro-level learning antecedents and environmental outcomes such as the effects of managerial capital and intentionality (Flier, Bosch, & Volberda, 2003; Pratap & Saha, 2018), capability gaps and multi-unit firms (Capron & Mitchell, 2009; Volberda, Baden-Fuller, & van den Bosch, 2001), and different types of transformational journeys (Agarwal & Helfat, 2009; Volberda et al., 2001). Yet, I argue that we have still failed to recognize the true nature of strategic renewal—*what* exactly are organizations strategically renewing through their evolutionary learning activities and *how* do they go about doing so?

I propose that the linkages between organizational learning and strategic renewal must be studied with respect to knowledge and innovation to allow for clearer conceptual development and rigorous empirical testing in organizational contexts. Specifically, I suggest that firms can extend their organizational lifespans through a continuous cycle of learning, unlearning, and wisdom gained by renewing their knowledge and innovation strategies over time. Further, for industry, this phenomenon may manifest in creative destruction activities and renewal of technological strategies throughout the firm's lifecycle. Ostensibly, our field has not yet conducted a quantitative study that operationalizes strategic renewal using archival data across multiple firms in multiple industries in order to effectively test our management theorization. Understanding how organizational learning, unlearning, and wisdom are related across numerous firms will lend insights into the transformation of knowledge as they redirect

their strategic intent and capabilities. Therefore, for this dissertation, I provide a review of literature linking strategic renewal, knowledge, and innovation and execute three quantitative studies of archival data that will allow our field to extend theory in organizational research. Figure 1 shows the overarching themes of the research.

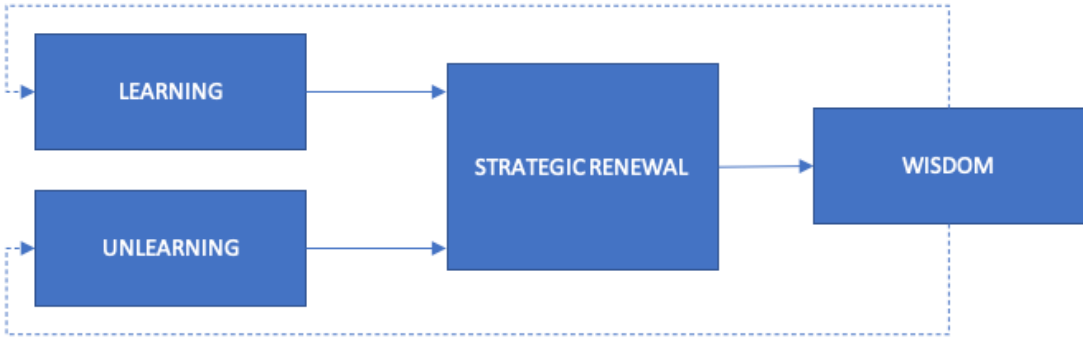


Figure 1: Learning, Unlearning, Wisdom, and Strategic Renewal

CHAPTER II

STRATEGIC RENEWAL

Huff et al. (1992) introduced the concept of strategic renewal into the management literature by highlighting the opposing forces of inertia (the tendency of a firm to continue pursuing its current strategy) and stress (the recognition by the firm that its current strategy is unsatisfactory) and proposed a four state formal model of strategic renewal: 1) incremental adaptation within the framework of current strategy; 2) deciding whether or not to consider a significant change in strategy; 3) envisioning renewal alternatives; and 4) honeymoon and trial. Additionally, Huff et al. (1992) provided mathematical models of the relationships between inertia and stress in each of the four states and simulated various scenarios in which a firm may change its strategy over the course of fifteen years resulting in either successful or unsuccessful strategic renewal. The authors conclude that an organization's history of strategic change affects its subsequent tendency to change strategy and that stress and inertia present in the early stages of an organization's lifecycle may have long term effects on how the organization changes its strategy over time.

From this launching point, strategic renewal has enjoyed a rich and varied research program in competitive strategy, corporate entrepreneurship, and strategy process literatures (Schmitt et al., 2018). Wiley Encyclopedia of Management defines strategic renewal as “the process of change and the outcome of adjustment in strategic

direction that have the potential to determine the long-term competitiveness of a firm” (Sammut-Bonnici & McGee, 2014: 1), and according to a review of past research by Schmitt et al. (2018: 81), strategic renewal “refers to the process that allows organizations to alter their path dependence by transforming their strategic intent and capabilities.” Therefore, strategic renewal research encompasses analyses of internal organizational properties, organizational change mechanisms, and the organization’s fit with the external environment. Schmitt et al. (2018) identify opposing views regarding antecedents (learning vs. resource), processes (induced vs. autonomous), and outcomes (co-alignment vs. co-creation). Referring to this framework, I discuss the precursors, mechanisms, and outcomes of strategic renewal including additional studies since the review and call attention to potential missing links of knowledge and innovation that will be tested in my empirical studies.

Strategic Renewal Antecedents (learning vs. resource)

What inspires or instigates organizations to renew their strategies continuously? Strategic renewal can be driven from learning or resources (Schmitt et al., 2018). Scholars supporting the organizational learning perspective of strategic renewal examine the ambidexterity of firms in balancing new ideas and engagements (exploration) with maximizing utility of existing products, services, or relationships (exploitation) (e.g., Capron & Mitchell, 2009). Other scholars call on the resource-based view arguing that firms can dynamically reconfigure their assets to continuously achieve strategic advantages over rivals (e.g., Warner & Wäger, 2019). Below, I highlight important

works supporting both the learning and dynamic capabilities views of strategic renewal antecedents.

Learning May Precede Strategic Renewal

The organizational learning view (Huber, 1991; Levitt & March, 1988; March, 1991) of strategic renewal antecedents is rooted in the challenges of balancing exploration and exploitation. Volberda et al. (2001) defined four strategic renewal journeys with variance in how firms approached learning, utilizing primary examples from the European financial services industry in the early 1990s. During its “emergent renewal”, ING had a strong bias toward exploitation, utilizing known systems and processes rather than pursuing innovative solutions while Rabobank’s leadership enabled “directed renewal” by establishing organizational change processes for integrating existing and new knowledge across all business units. In its “facilitated renewal” journey, Citibank took a different approach to balancing exploration and exploitation by establishing a laboratory separate from core operations. Finally, in “transformational renewal” firms formalize a grander, company-wide process for continuous renewal by supporting a long-term view of moving from strong exploration to strong exploitation and vice versa; the authors provided examples from Novotel and British Airways.

Additionally, Crossan and Berdrow (2003) integrated the 4I organizational learning framework from Crossan et al. (1999) in an in-depth case study of strategic renewal at Canada Post Corporation (CPC) covering a span of ten years. Through interviews and archival documentation, the study identified support for CPC’s intuiting

(recognition of patterns or possibilities), interpreting (explanation of insights), integrating (creation of shared understanding), and institutionalizing (establishment of routinized actions) across individual, group, and organizational levels. The authors provided new insights into how organizational learning enables strategic renewal through dynamic feedforward (exploration) and feedback (exploitation) processes bolstering the propositions of Crossan et al. (1999) with qualitative evidence.

Furthermore, Kwee, Van Den Bosch, and Volberda (2011) investigated a single organization's strategic renewal over time with a quantitative analysis of the effects of top management team members' corporate governance orientation on exploitative, explorative, internal growth, and external growth actions. In their longitudinal analysis of Royal Dutch Shell from 1907 to 2004, the authors found that nationality and functional background of top managers influence organizational learning, strategic renewal, and the longevity of the firm. In summary, the selected studies provide insights into how organizational learning impacts strategic renewal—firms must simultaneously take risks through search, experimentation, and innovation while maintaining existing operations through refinement, implementation, and execution.

Resources May Precede Strategic Renewal

From the resource and capabilities perspective (Barney, 1991; Eisenhardt & Martin, 2000; Teece, Pisano, & Shuen, 1997) of strategic renewal antecedents, firms must consider current assets and restructure them to achieve and maintain a competitive advantage (Whitney, 1996). Capron and Mitchell (2009) explicated how firms use

internal development and external sourcing of new capabilities to survive longer.

Through a survey and 26 interviews of firms in the global telecommunications industry, the authors found that internally developing new capabilities when there is a small capability gap and needed capabilities fit within their internal social context results in more effectively obtaining new capabilities and extended survival. Additionally, the study found that externally sourcing new capabilities when there is a large capability gap and needed capabilities conflict with their internal social context results in more effectively obtaining new capabilities and extended survival.

More recently, Warner and Wäger (2019) studied firms building dynamic capabilities for digital transformation in traditional industries such as banking, automotive, telecommunications, and media publishing. Expounding seven case studies in seven different industries, the authors provided evidence that “digital technology is changing strategizing” and that the scope of digital transformation depends on the strategic renewal of an organization’s business model, collaboration, and culture. For digital transformation to support strategic renewal, especially in traditional industries, Warner and Wäger (2019) found that firms must have dynamic sensing (scouting, scenario planning, mindset crafting), seizing (rapid prototyping, balanced digital portfolios, strategic agility), and transforming (navigating innovation ecosystems, internal structure redesigning, digital maturity improvement) capabilities.

A number of strategic renewal studies appear to blend ideas from organizational learning with the resource-based view and dynamic capabilities. Burgers, Jansen, Van

den Bosch, and Volberda (2009) investigated how firms rectify structural differentiation issues when pursuing corporate venturing within their established organizations using “integration” mechanisms—integration being one of the 4Is of organizational learning. Ben-Menahem, Kwee, Volberda, and Van Den Bosch (2013) studied strategic renewal at Royal Dutch Shell combining the absorptive capacity perspective of organizational learning with a “knowledge-based perspective”. And, Williams, Chen, and Agarwal (2017) examined how “knowledge integration” within a top management team impacted firms’ abilities to execute strategic renewal. Ultimately, the nuance is whether knowledge is considered to be a resource facilitating dynamic capabilities or the vehicle for innovation and organizational learning.

Knowledge and Innovation Contribute to Strategic Renewal

In my view, strategic renewal fundamentally requires transmuting an organization’s knowledge. Prior to engaging in renewal activities, an organization must first understand its current knowledge base and propensity for innovation. Changing knowledge is associated with organizational learning while propensity for innovation may be a dynamic capability—yet innovating the organization’s knowledge is inherently the learning journey of strategic renewal. What knowledge is working? What knowledge is not? How will the organization close the gap between the current state of its knowledge base and the desired future state? Due to bounded rationality (Simon, 1959), an organization must balance new avenues explored through innovation, existing knowledge exploited to sustain viability through strategic transitions, and shedding

obsolete knowledge that is no longer applicable in its new reality. Furthermore, external stakeholders and environmental factors must be taken into consideration—other constituents may be dependent on the organization’s knowledge, and the industry or market conditions may not be conducive to the changes the organization seeks. Therefore, an organization or firm should first recognize how its knowledge base is structured and used prior to engaging in strategic renewal activities. These ideas will be discussed further and examined in Study 1 and Study 2.

Strategic Renewal Mechanisms (induced vs. autonomous plus macro processes)

The processes of strategic renewal have been proposed in both microfoundational research and macro-level strategy research. According to the review by Schmitt et al. (2018), strategic renewal requires people to initiate and implement organizational change, and the authors posed the primary question as ‘at what level in the organization does this initiation and implementation occur?’. From a macro perspective, researchers have explicated firm mechanisms supporting strategic renewal, ideal types of strategic renewal, and the relationship of interdependent activity systems with respect to strategic renewal. I discuss both micro and macro processes involved with strategic renewal here.

Microprocesses of Strategic Renewal

Microfoundational mechanisms of strategic renewal require analysis of human behavior. Those favoring “induced” strategic renewal processes call on upper echelons theory (Hambrick & Mason, 1984) and conduct studies on the top management teams (e.g., Simons, 1994a) while those advocating for “autonomous” strategic renewal

processes enlist aggregated and multilevel views (e.g., Pratap & Saha, 2018). In my view, microfoundational research in strategic renewal mechanisms follows two substreams of theory across all of these levels: control systems and managerial roles.

Simons (1994a) investigated how management control systems impact strategic turnaround and strategic evolution. A management control system encompasses the “formal, information-based routines and procedures used by managers to maintain or alter patterns in organizational activities” (Simons, 1994a: 170) including belief systems, boundary systems, diagnostic control systems, and interactive control systems (Simons, 1987). In an 18-month qualitative study of ten newly appointed top managers at ten different businesses in ten different industries, the author found that control systems can be used to overcome organizational inertia, communicate details of the manager’s vision and strategy including timelines, goals, and incentives, and help to focus the organization on learning as it launches into the uncertain future with renewed strategic objectives. A book by Simons (1994b) also supported these ideas with a ten-year study of control systems in more than 50 U.S. firms. Furthermore, Poskela and Martinsuo (2009) examined the relationships between management control systems and strategic renewal by incorporating the front-end of innovation in a cross-sectional survey of 137 Finnish executives. The authors hypothesized that control systems in the ideation phase of product development, moderated by market uncertainty and technology uncertainty, would influence the firm’s alignment to a new intrinsic task motivation and strategic vision and found results supporting these hypotheses.

Another area of microfoundations of strategic renewal studied are the roles of managers. Floyd and Lane (2000) suggested that managers at different levels in the organization have multiple strategic roles and that those roles may conflict, but control systems can help alleviate the conflict. Among operating managers, their roles in strategy may include experimenting, adjusting, and conforming while middle managers are responsible for championing, synthesizing, facilitating, and implementing. In the top management team, the strategic roles include ratifying, recognizing, and directing. These roles may conflict during strategic renewal subprocesses of competence definition, deployment, and modification. More recently, Pettit and Crossan (2020) conducted a case study at a national news organization on how occupational members may impact strategic renewal. While prior research had emphasized the disruptive and resistant nature of nonmanagerial organizational members, the study illustrated that these members contribute to strategic renewal in different ways. Some members may facilitate strategic renewal with affirming and coding change, while other members may disrupt change with policing actions.

In summary, scholars studying the microprocesses of strategic renewal rely on psychological and behavioral lenses to interpret how people within organizations manage strategy and change. Top management, middle management, and subordinate employees interact to identify renewal activities needed, formulate plans to implement innovations, and execute tasks to support organizational change objectives. Strategic

renewal microprocesses can support or hinder the overarching macroprocesses that the organization seeks to carry through.

Macroprocesses of Strategic Renewal

Strategy researchers have proposed macro level mechanisms, types, and systems of strategic renewal. Baden-Fuller and Volberda (1996) proposed four mechanisms of strategic renewal to resolve the paradox of change and stability with spatial and temporal separation of changes: venturing, restructuring, reanimation, and rejuvenation. Calling on a competence-based view in which knowledge is shared among a large group of units within a complex organization, firms may pursue: 1) venturing – creating new business units and selling old units as commanded from the top level of the organization; 2) restructuring – reorganizing divisions, creating new priorities, and generating new products as determined by the top level of the organization; 3) reanimating – using goals or decision making rules and modifying them in double-loop learning from the bottom-up; or 4) rejuvenating – revitalizing core competencies of the organization with holistic change programs.

Additionally, Volberda et al. (2001) defined four strategic renewal journeys by differences in the sources of variation, loci of unit selection, knowledge design, and competitive positioning, in addition to the balance of exploration and exploitation previously discussed. In “emergent renewal”, variation comes from the market in an external selection environment; the market knows best, and firms follow industry rules. In “directed renewal”, variation comes from hierarchy with top management determining

unit selection; top management knows best, and firms adapt to industry rules. In “facilitated renewal”, variation comes from co-evolution in an internal selection environment; front and middle management orchestrate knowledge integration, and the firm influences industry rules. Finally, in “transformational renewal”, variation comes from shared sensemaking among top, middle, and frontline managers; the organization knows best and actively changes industry rules.

Moreover, Albert, Kreutzer, and Lechner (2015) provided nine propositions with respect to the relationship between organizational activity systems and strategic renewal. Citing a “paradox of whether interdependencies within an organization’s activity system enable or hinder strategic renewal”, the authors posed three factors pertaining to modularity (the extent of decomposability of activity systems into subsystems), concentration (the extent of connections between core and peripheral systems), and openness (the extent of co-evolution between internal and external systems). The authors proposed that less modularity, more concentration, and more openness among activity system interdependencies would enable strategic renewal with the effects being enhanced by more stringent and less immediate interdependency rules.

Fundamentally, scholars explicating strategic renewal macroprocesses rely on categorization techniques to interpret renewal activities at the organization or firm level of analysis. Very large, diversified firms may pursue renewal differently across business units depending on the external environment, internal management, and readiness for change; strategic renewal at these firms may be slow and methodical. Smaller, more

agile firms may pursue a continuous stream of renewal activities very quickly until a stable identity is established within its chosen industry; as time continues and the organization grows, it will seek renewal activities in a more orchestrated manner. At both large and small firms, management's understanding of the interplay between knowledge and innovation is the key to pursuing effective renewal endeavors.

Knowledge and Innovation Processes of Strategic Renewal

In my perspective, strategic renewal combines both microprocesses and macroprocesses to make changes to an organization, yet the interplay of organizational knowledge and innovation competencies is the essence of strategic renewal.

Organizational knowledge is a social construction that exists in a tacit dimension (Berger & Luckmann, 1967; Polanyi, 1966). As constituents interact with each other, the internal environment, and the external environment, knowledge becomes embedded in the fabric of the organization. Through introducing new methods and ideas while releasing antiquated processes and schemas, the organization constantly reconfigures its cognitive maps. In strategic renewal activities, managers and employees must intentionally seek and create new knowledge that enables the organization to diverge from its previous path. On the other hand, clinging to obsolete or misleading knowledge may obstruct the organization's transformational journey. Ultimately, success or failure of strategic renewal hinges on knowledge and the ability to learn, unlearn, and reinject wisdom into the organization's innovation engine. I explore these premises further below and

examine how organizational knowledge changes during strategic renewal in Studies 1, 2, and 3.

Strategic Renewal Consequences (co-alignment vs. co-creation)

What do firms attain by continuously renewing their strategies? Strategic renewal may result in co-alignment or co-creation depending on the purpose of the activity (Schmitt et al., 2018). Researchers promoting views from population ecology and institutional theory advocate that the environment shifts and organizations align accordingly (e.g., Jones & Macpherson, 2006) while those supporting a co-evolutionary perspective provide evidence that organizational change influences environmental change and, as such, firms may create future competitive advantages in their industries (e.g., Kim & Pennings, 2009). I review key contributions to each perspective here.

Strategic Renewal Can Result in Co-Alignment

In order to achieve high reliability, accountability, and reproducibility, firms may pursue strategic renewal actions that exploit their current strengths rather than explore new unknown avenues (Flier et al., 2003). This population ecology perspective of selective adaptation results in organizations aligning with their environments (Hannan & Freeman, 1977). Ravasi and Lojacono (2005) also proposed that firms can align with the environment through “design-driven renewal” in four phases: 1) generating new ideas; 2) evaluating and selecting ideas; 3) revising design principles; and 4) diffusing new design principles. The authors provide case study examples of co-adaptation journeys from Apple, Alessi, and Bang & Olufsen.

From an institutional theory perspective (DiMaggio & Powell, 1983), incumbent firms may learn from their environments and pursue strategic renewal actions through normative, mimetic, or coercive isomorphism (Flier et al., 2003). Jones and Macpherson (2006) presented three case studies of private, owner-managed firms with evidence that strategic renewal occurred in these organizations through environmental influences from authoritative bodies (normative), imitation of best practices from other organizations (mimetic), and direct pressure from customers for adoption of new practices and knowledge (coercive). Additionally, Kim and Pennings (2009) evaluated 1,463 new racket designs in the tennis industry supporting the idea that firms may imitate innovations in order to renew their strategies and stay competitive within the marketplace.

In summary, the co-alignment perspective of strategic renewal renders organizations merely responding to changing environmental circumstances. As the organization experiences stress from misalignment with its environment, inertial forces acquiesce the reassimilation of fit. Firms may reinforce current activity systems, imitate renewal initiatives similar to others in their industry, or submit to changes only when faced with regulatory pressures. In the co-alignment view of strategic renewal, organizations are primarily passive.

Strategic Renewal Can Result in Co-Evolution

Large complex organizations may also co-evolve with their industries as they adjust their routines and technologies through revitalization of existing competencies

and/or reordering core and peripheral competencies (Baden-Fuller & Volberda, 1997). Co-evolution may involve bridging the gap between the corporation and the community in which it resides to create a shared context; knowledge transfer between the corporation and its industry also enables the formation of new cognitive networks between entities through corporate venturing (Keil, 2002). As firms change strategies, their respective industries change. Industry changes then influence further firm changes, and co-evolutionary strategic renewal cycle continues indefinitely.

Flier et al. (2003) also examined British, Dutch, and French financial services firms through a co-evolutionary lens. The authors proposed that firm strategic renewal results in co-creation with its environment when considering combined effects of industry selection, country institutional effects, and managerial intentionality. Through qualitative case studies of the content (exploitation-to-exploration ratio), context (external-to-internal ratio), and process (timing, frequency, and volatility) of strategic renewal actions, the authors found support that firms co-evolve with the industry over time.

Agarwal and Helfat (2009) conducted an in-depth case study of IBM. Perhaps the most classic example of strategic renewal, IBM has evolved over the course of more than one hundred years from dial recorders and tabulating machines to personal computers and rack servers to cloud software and consulting services. In studying IBM's discontinuous strategic transformations and incremental renewal over time, the authors suggest that strategic renewal has critical outcomes for individual firms, industries, and

entire economies. IBM maintains innovative leadership as the U.S. company with the most patents, shaping multiple industries in which it participates.

Ultimately, the co-evolutionary view of strategic renewal portrays organizations as active participants amidst interrelated forces of adaptation and selection.

Organizations take action to recursively create themselves and their environments. A firm with a co-evolutionary perspective of its environment explores innovative ways of accomplishing objectives while exploiting its existing knowledge to sustain operations through continuous transformations.

Knowledge and Innovation Outcomes of Strategic Renewal

My position is that organizations have agency when it comes to strategic renewal. Rather than being passively shaped by the environment, a successful organization owns its destiny. To the extent that the organization understands its current routines, searches for knowledge to modify routines, and innovatively implements changes to routines, the organization evolves with its environment (Nelson & Winter, 1982). Applying experience, knowledge, and good judgment in its strategic renewal activities, an organization continuously accumulates and implements wisdom to remain viable into the unforeseeable future. The sagacious organization ceaselessly evaluates what is known against what is not known and intrepidly takes actions to establish, maintain, and renew a distinguished identity. Undertaking a perpetual cycle of learning and unlearning, organizations strategically renew knowledge, innovate routines, and capture percipience to achieve and sustain relevance in their environments. I explicate

the connections between strategic renewal, knowledge, and innovation in subsequent sections and examine consequential organizational wisdom in Study 3.

CHAPTER III

STRATEGIC RENEWAL, KNOWLEDGE, AND INNOVATION

Scholars have studied strategic renewal of organizations for many decades (Huff et al., 1992; Pettit & Crossan, 2020; Schmitt et al., 2018). While our research has led to explanations of precursors, processes, and results of strategic renewal, we lack clarity in specifying what exactly organizations are renewing and how they go about doing so. Oxford Languages dictionary defines *strategic* as “relating to the identification of long-term or overall aims and interests and the means of achieving them” and *renewal* as “an instance of resuming an activity or state after an interruption”. Thus, strategic renewal relates to the desired future state of an organization and deliberate actions taken to achieve it. Yet, the process is continuous—organizations persist in constant cycles of planning, executing, and evolving with their environments.

As researchers, we can observe and implicate beginnings and ends of continuous phenomena. For a practitioner, her or his career may entail participation in multiple instances of organizational renewal over the course of 40 or so years. For an organization, however, its longevity depends on endless revolutions of strategic changes that extend beyond the participation of any one human constituent. Kongo Gumi, founded in the year 578, is a Japanese construction firm and the oldest company in the world. Caswell-Massey is a perfume and soap company founded in 1752, listed as the oldest company in America. How have these firms remained viable in their industries?

Construction technology has advanced over thousands of years from human labor using natural materials to colossal machines assembling synthetic components. Perfume and soap manufacturing has progressed from small-scale craft commerce to mass production, internet marketing, and global distribution.

While case studies of these two examples are beyond the scope of my dissertation, I suggest that organizational research must view strategic renewal from the perspectives of knowledge and innovation in order to understand how firms evolve with their industries and perpetually sustain viability. Organizational knowledge is in constant flux (Spender & Grant, 1996; Spender, 1996), and a firm's combinative capabilities reflect innovation and development of new technology within its industry (Kogut & Zander, 1992, 1996). For a firm to successfully renew itself, it must understand what it knows, what it does not know, and how to close that gap through continuously changing its knowledge base. I discuss organizational knowledge, technology, and innovation research and investigate the relationships with strategic renewal in three empirical studies.

Organizational Knowledge

In the market economy, knowledge is diffused by people, places, and time—no two individuals possess the same stock of knowledge, information, or interpretations of the environment. This information asymmetry among constituents ultimately leads organizations to base decisions on seemingly incomplete knowledge, thus a balance of central planning and decentralized coordination must be met to achieve success (Hayek,

1945). Though explicit knowledge may be easily articulated, documented, shared, and applied as implicit knowledge transferred from one individual to another, tacit knowledge—tradition, inherited practices, implied values, and prejudgments—is gained from experience and more difficult to express or transfer between individuals (Polanyi, 1966). “I shall reconsider human knowledge by starting from the fact that we can know more than we can tell,” Polanyi writes (p. 4).

Beyond individual human knowledge, an organization possesses knowledge that is embedded in its existence. More than the aggregate knowledge of human constituents at any point in time, an organization’s tacit dimension is a social construction of reality (Berger & Luckmann, 1967). Over time, people and groups interacting within the organization create concepts or mental representations of each other’s actions. When constituents subsequently interact, they carry the concepts or mental representations forward in a habitual and reciprocal manner, resulting in institutionalized interactions—the meaning of their actions are interwoven in the social fabric of the organization.

The concept of organization-level knowledge further took shape in the late 20th century as scholars increasingly examined for-profit firms. Nelson and Winter’s (1982) influential book “An Evolutionary Theory of Economic Change” laid out the fundamental concepts that: 1) routines act as the genes of the firms; 2) firms search for innovative or imitative solutions to improve profits; 3) successful firms grow at the expense of less successful firms; 4) firms interact and create a relative competitive environment; and 5) firms may fail at finding the best technological solutions. Routines

are capabilities “for a smooth sequence of coordinated behavior that is ordinarily effective relative to its objectives, given the context in which it normally occurs.” To Nelson and Winter, routines are the central concept for understanding how firms operate and interact with each other in their environment. The book also explains the theory of organizational memory which eventually led to organizational learning theory (Levitt & March, 1988). Additionally, Nelson and Winter view innovation as the combination of new routines as a reaction to change or failure.

Though some scholars maintained that knowledge is a human resource and the organization only exists to apply knowledge (Barney, 1991; Grant, 1996), management researchers primarily supported the evolutionary perspective that firms exist to create knowledge continuously in order to sustain a competitive advantage (Kogut & Zander, 1992; Nonaka, 1994; Nonaka & Johansson, 1985). Bringing Polanyi’s tacit dimension, Berger and Luckman’s sociology of knowledge, and Nelson and Winter’s evolutionary perspectives together, Nonaka and Takeuchi’s (1995) book “The Knowledge-Creating Company” examines how companies create new organizational knowledge and successfully utilize it to commercialize new products and technologies. Organizations transform tacit knowledge into explicit knowledge. Social actors communicating indirectly through metaphor and analogy subsequently infuse their experiences into definitive manuals, procedures, products, services, and systems. Because of constant change among customers and competitors, firms must continuously create and exploit knowledge to evolve with the environment. Nonaka and Takeuchi support these ideas

with case studies from firms and organizations such as Honda, Canon, Matsushita, NEC, Nissan, 3M, GE, and the U.S. Marines.

By making knowledge the basis of a dynamic theory of the firm, organizations may be viewed from a sociotechnical systems perspective as activity systems guided by managerial heuristics (Spender, 1996). Organizational knowledge can be acquired, transferred, or integrated to achieve sustained competitive advantage (Eisenhardt & Santos, 2002) yet management researchers may continue to debate how to best represent the multilevel nature of knowledge within an organization and the associated value creation (Felin & Hesterly, 2007). In my view, if we incorporate the sociology of technology (Pinch & Bijker, 1984; Rosen, 1993), we see evidence of knowledge stocks, knowledge flows, and knowledge production within firms (Zucker, Darby, Furner, Liu, & Ma, 2007) as well as the decomposability in knowledge structures, the impact on the usefulness of inventions, and the malleability of firm knowledge bases (Yayavaram & Ahuja, 2008). Therefore, the key to understanding organizational knowledge may lie within understanding technological innovation.

Technology and Innovation

Rooted in Schumpeter's (1934) view of creative destruction, research in the technology and innovation area of organizational management analyzes strategic success from the perspective of technological output of firms and industries. Anderson and Tushman (1990) proposed a cyclical model of technological change that follows the pattern of 1) a competence enhancing or competence destroying technological

discontinuity occurs in which a fundamentally different process or product improves costs, performance, or quality over current technologies; 2) an era of ferment follows in which firms compete between regimes and within the new regime; 3) a single architecture is selected as the dominant design in the technological class; 4) an era of incremental change ensues in which firms offer lower costs and differentiation through minor design variations and strategic positioning; and the era of incremental change continues until 5) another technological discontinuity occurs. Using Campbell's (1969) variation-selection-retention model of analysis, Anderson and Tushman (1990) analyzed the technological cycle in the cement, glass, and minicomputer industries spanning multiple decades.

Henderson and Clark (1990) also provided a view of technological innovation with their empirical analysis of the photolithographic alignment industry between 1962 and 1986. The authors proposed that different organizational capabilities lead to different competitive consequences and that technological change can be classified into incremental, radical, modular, or architectural depending on considerations of component and/or architectural innovation. The study found that established firms failed to produce next generation equipment because they ignored potential architectural innovation while focusing on their own current architecture or component success. Also providing theory on differences between component and architectural innovation, Christensen (1992b; 1992a) examined hard-disk drive industry S-curves which could describe technological advancement but cannot prescribe a firm's research program. For

component technology, incumbents led S-curve switching and new entrants were rarely successful, yet the opposite was true for architectural technology—entrant firms led development and shipment of new technology because incumbents ignored potential market opportunities.

Other views of technology and innovation incorporate March's (1991) ideas on organizational learning—exploration and exploitation, focusing on firm strategies to collaborate in networks and form alliances with other firms. Powell, Koput, and Smith-Doerr (1996) found that the locus of innovation was found in interorganizational networks as biotechnology firms that collaborated with other firms achieved greater levels of technological output. Stuart (1998) examined network positions of firms in the semiconductor industry and found that firms in crowded positions and with high prestige forms collaborative alliances at the highest rates. Furthermore, Ahuja and Katila (2001) investigated acquisitions in the global chemicals industry finding that a firm's acquired knowledge base led to successful innovation performance, and in their study of public U.S. software firms, Lavie and Rosenkopf (2006) determined that alliance formation is path dependent as firms must balance exploration and exploitation.

Contributing an interesting view that teams may not always be better than an individual, Taylor and Greve (2006) found that highly creative individuals in the comic book industry were better able to combine knowledge diversity repeatedly than multimember teams who produced innovations with greater performance variance. Additional extensions to theory in the technology and innovation stream include

cognitive views of technical change (Kaplan & Tripsas, 2008), the mediating role of customer interaction practices (Foss, Laursen, & Pedersen, 2011), technology S-curves in innovation ecosystems (Adner & Kapoor, 2016), and knowledge flows in open innovation engagements (Cassiman & Valentini, 2016).

Synopsis of Three Studies

In summary, management researchers have examined antecedents, mechanisms, and outcomes of strategic renewal from multiple angles over the course of nearly thirty years. However, I contend that our field has not yet understood the quintessential factors of *what* exactly organizations are renewing and *how* they go about doing so. Therefore, I propose that strategic renewal entails fundamental changes to organizational knowledge through innovation. As capturing the tacit dimension of knowledge within organizations may be out of reach, I believe that investigating technological innovation of firms engaging in strategic renewal will offer our field new insights into theory. Study 1 further probes the relationships between organizational *learning* and strategic renewal by investigating exploration, exploitation, and technology adoption. Study 2 contributes a new antecedent to strategic renewal as firms must *unlearn* knowledge during their transformational journeys. Study 3 recommends a new consequence of strategic renewal—organizational *wisdom* further enables firms to continuously co-evolve with their environments. Figure 2 shows the synopsis of the three studies in this dissertation.

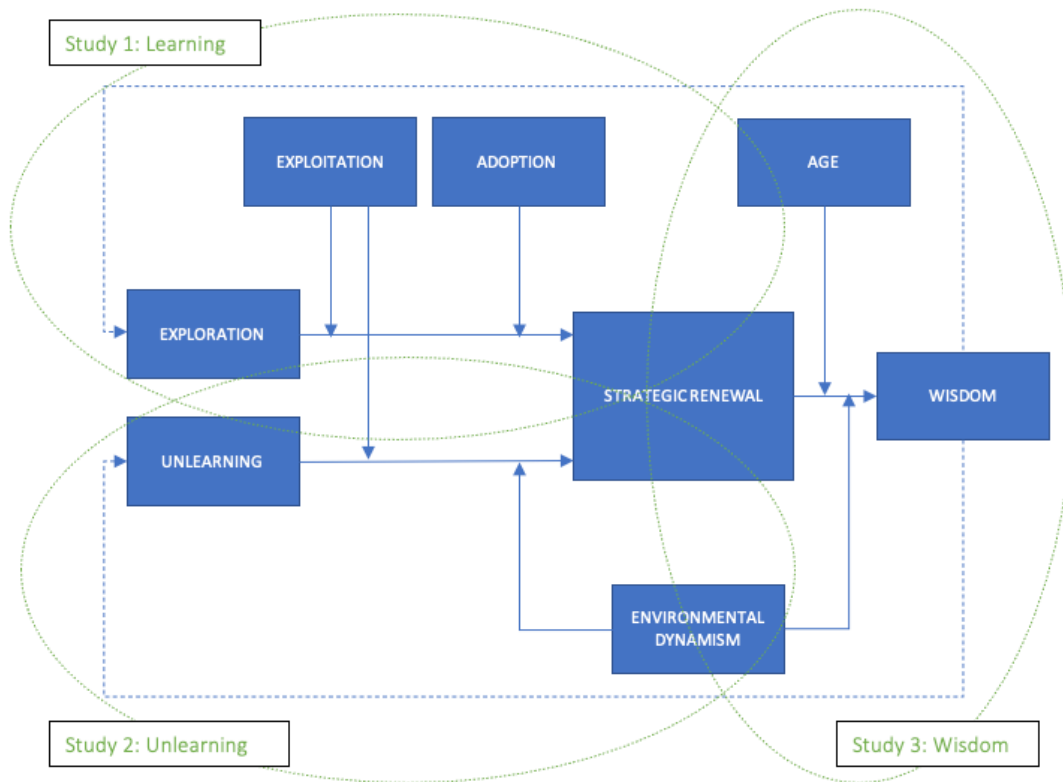


Figure 2: Synopsis of Three Studies

CHAPTER IV

STUDY 1: LEARNING AND STRATEGIC RENEWAL

Scholars agree that organizational learning impacts strategic renewal—exploration of new knowledge and exploitation of current knowledge contribute to consecutive changes in firm strategy. Many aspects of the effects of exploration and exploitation on strategic renewal have been qualitatively investigated (e.g., Crossan & Berdrow, 2003; Flier et al., 2003) and quantified in a few ways (see Kim & Pennings, 2009; Kwee et al., 2011); however, our field lacks rigorous empirical validation of these hypothetical links between organizational learning and strategic renewal. Thus, I propose an examination of the relationships through a more generalized theoretical lens of knowledge and innovation which will also allow for a comprehensive quantitative study of strategic renewal in a technology context. First, I review extant literature linking organizational learning and strategic renewal. Second, I hypothesize linkages with knowledge and innovation. Third, I quantitatively test my hypotheses utilizing patent data from 163 public U.S. communications equipment manufacturing firms between the years 1975 and 2020.

Theory and Hypotheses

Organizational Learning

Extending from The Behavioral Theory of the Firm (Cyert & March, 1963), organizational learning concerns the collective acquisition of knowledge and skills

through the organization's experience. Levitt and March (1988) introduced organizational learning with the concept of routines—broadly encompassing forms, rules, procedures, conventions, strategies, beliefs, frameworks, paradigms, codes, cultures, and knowledge that are transmitted through socialization, education, imitation, professional, personnel movement, and mergers and acquisitions. Routines are independent of individual actors within the organization and can survive member turnover. Organizational learning occurs by encoding inferences from experiences into routines to guide behavior, thus it is routine based, history dependent, and target oriented. Routines are preserved through socialization and control into a collective organizational memory that is recorded, conserved, and retrieved from; organizational memory shapes the path that an organization takes. Because the past is not a perfect predictor of the future, organizational learning is difficult. Routines and beliefs change in response to direct and indirect experience—directly through trial and error experimentation, search, or learning by doing, and indirectly from others through organizational networks and institutional isomorphism (coercive, mimetic, normative). Institutional change may bring organizational change.

Furthermore, March (1991) discussed the tradeoff of costs and benefits across space, time, and ecological interaction by differentiating between the processes of exploration and exploitation. Exploration includes “search, variation, risk-taking, experimentation, play, flexibility, and innovation” while exploitation includes “refinement, choice, production, efficiency, selection, implementation, and execution”

(p. 71). Thus, firms explore when they are seeking new knowledge currently unknown within their organization, and firms exploit when they use existing knowledge to leverage and capitalize on an advantage in the marketplace. With a broader scope of organizational learning, Huber (1991) explicated four contributing processes: 1) knowledge acquisition, i.e. how knowledge is obtained; 2) information distribution, i.e. how information is shared and leads to new information or understanding; 3) information interpretation, i.e. information is given a common understanding within the organization; and 4) organizational memory, i.e. how knowledge is stored for future use. To Huber (1991: 89), “an entity learns if, through its processing of information, the range of its potential behaviors is changed.”

Other foundational work in the organizational learning area include the myopia of learning and the 4I organizational learning framework. Levinthal and March (1993) built on Levitt and March’s (1988) idea that learning is a form of intelligence and March’s (1991) ideas of exploration and exploitation saying there may be pitfalls involved. Organizations may suffer from myopia, or nearsightedness, by overlooking distant times, distant places, and failures and must avoid the failure trap of exploration driving out exploitation and the success trap of exploitation driving out exploration. Crossan et al. (1999) proposed a “4I” framework of organizational learning as the principal means of achieving strategic renewal. The framework includes: 1) intuiting, preconscious recognition of patterns and possibilities; 2) interpreting, explaining via words and actions to self and others; 3) integrating, developing a shared understanding

and coordinating action; and 4) institutionalizing, ensuring routinized actions occur. By framing organizational learning this way, researchers can consider the tension between exploration and exploitation in multilevel analyses linking the social and psychological processes bidirectionally between cognition and action.

Organizational learning has enjoyed a rich and varied research program including empirical support and theoretical extensions such as the impact of historical and social aspiration levels on organizational change in the radio broadcasting industry (Greve, 1998), experiential and vicarious learning among nursing homes in Ontario, Canada (Baum, Li, & Usher, 2000), and the institutional impact of the Women's Christian Temperament Movement on the brewery and soft drink industries (Hiatt, Sine, & Tolbert, 2009). Additionally, Benner and Tripsas (2012) studied the evolution of the digital camera industry as firms entered the market from various prior industries (photography, consumer electronics, computer) and found that prior industry experience shaped the beliefs and behaviors of the firms in the new market. Also relating organizational learning to technological change, Khanna, Guler, and Nerkar (2016) found that biotechnology firms' previous failures provided valuable feedback that influenced their subsequent research and development success. More recently, scholars have examined experiential and vicarious learning over time (Aranda, Arellano, & Davila, 2017) and balancing exploration and exploitation in efforts to manage organizational legitimacy (Desai, 2018).

Organizational Learning and Strategic Renewal

In their reflections on ten years of building organizational learning theory, Crossan et al. (2011: 449) stated: “Strategic renewal is the endogenous variable of interest in the 4I framework.” However, in their review of literature, there was little attention paid directly to strategic renewal aside from papers written by Crossan, Lane, or White and co-authors, though many other scholars did connect organizational learning with strategic changes such as alliances and joint ventures without explicitly referring to renewal. In my review of the literature, I found similar results even ten years later and discuss the most important developments here: the relationships between strategic renewal and exploration / exploitation, dynamic capabilities / absorptive capacity, and knowledge management.

Crossan and Berdrow (2003) used a 4x4 matrix of the 4Is as inputs versus outputs to examine the dynamic cross-level individual, group, and organizational processes of learning over the course of ten years of strategic renewal at Canada Post Corporation (CPC). Exploration through feed-forward occurred when, for example, a CPC manager envisioned electronically connected post offices (intuiting), communicated his idea throughout the organization (interpreting), implemented franchising at urban locations (integrating), and eventually expanded the concept to include the other rural locations (institutionalizing). Evidence of exploitation through feedback was shown in the institutionalization of national and district control centers which facilitated integration of CPC’s new operational strategies, guided interpretations

of new information, and also resulted in the intuition of new ideas continuously reinjected into the organization's renewal efforts.

Kwee et al. (2011) further investigated the relationship between strategic renewal and organizational ambidexterity in their longitudinal analyses of Royal Dutch Shell plc, qualitatively (1907-2004) and quantitatively (1959-2004). Through the lens of upper echelons theory (Hambrick & Mason, 1984), the authors studied how top management team member nationality influenced the content (exploitation, exploitation) and context (internal focus, external focus) of strategic actions pursued by the firm over time. While Anglo-Saxon corporate governance orientation resulted in more exploitative and externally-directed growth pursuits, Rhine corporate governance orientation resulted in more exploratory and internally-directed growth pursuits. Thus, the strategic renewal trajectory of a firm may reflect the top management team's inherent orientation toward exploitation or exploration.

While the debate on whether organizational ambidexterity provides the best explanation of strategic renewal antecedents is ongoing, scholars have also applied dynamic capabilities and absorptive capacity variants of learning theory to analyze firms altering their path dependence through strategic changes. Defined as "the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments" (Teece et al., 1997: 516), dynamic capabilities may include modifying organizational routines and managerial skills to pursue strategic renewal. Burgers et al. (2009) surveyed executive directors at 240 firms with respect to the effects

of structural differentiation—the separation of innovation and efficiency activities—on the extent of entering new business fields through corporate venturing. Structural differentiation had a positive effect on the extent of creating new ventures which was strengthened by a shared organizational vision and weakened by cross-functional interfaces and social integration among senior managers. Therefore, the ability of a firm to dynamically adjust its operations may affect its ability to renew itself through exploratory learning.

Related to the capability to adjust factors both internal and external to the firm, absorptive capacity describes the firm's "ability to recognize the value of new information, assimilate it, and apply it to commercial ends" (Cohen & Levinthal, 1990: 128). A firm may have potential absorptive capacity (the capability to value and acquire external knowledge without the guarantee of being able to exploit it) and realized absorptive capacity (the reflection of the transformation and exploitation of newly absorbed knowledge) (Zahra & George, 2002). Ben-Menahem et al. (2013) applied these concepts in another longitudinal strategic renewal analysis of Royal Dutch Shell plc between 1980 and 2007. Operationalizing potential absorptive capacity as the ratio of R&D expenditures to annual revenues, realized absorptive capacity (indicating the internal rate of change) as the number of strategic renewal actions per year (e.g. new products and services, process innovations, venturing, and restructuring), and the external rate of change as the rate of change in the price of crude oil, the study found that

potential absorptive capacity enables firms to align internal and external rates of change to support strategic renewal.

Though I contend that knowledge is the implied unit of transaction in organizational learning, ambidexterity, dynamic capabilities, and absorptive capacity views, scholars have only recently begun to link knowledge management directly with strategic renewal. Williams et al. (2017) investigated how various types of knowledge brought into top management teams can affect incremental strategic renewal and subsequent firm growth. In their study of the U.S. cellular industry between 1983-1998, the authors found that new outside rookies contributed to higher growth in the total number of subscribers than other types of executives and that seasoned outsiders contributed to growth only when they joined a long-tenured top management team. Therefore, knowledge that executives bring from their different experiences throughout their careers may be important factors in how a firm navigates strategic renewal activities.

Recently, Pettit and Crossan (2020) studied how occupational knowledge may impact the changes necessary for renewing organizational strategy. In a case study at a North American news organization shifting from traditional print editions to digital formats, the authors outlined patterns with which different occupations among employees either facilitated or disrupted strategic renewal efforts through affirming, coding, and/or policing occupational identities. For example, journalists facilitated strategic renewal through recoding their efforts to focus on simplifying their narratives

for an enhanced online reader experience. Additionally, outsourcing copy editing disrupted strategic renewal because the reduced number of remaining editors had to police the content that came through to maintain their desired quality standards. Ultimately, organizational knowledge shifted as the organization shifted its strategy.

Knowledge, Innovation, and Strategic Renewal

Changing an organization's or firm's knowledge is essential for strategic renewal. Acquiring and creating new knowledge through exploration activities of search, experimentation, and variation involves taking risks outside the organization's comfort zone (March, 1991). Exploration can be beneficial for generating alternatives for strategic renewal as well as bolstering momentum to pursue strategic changes. In their study of the optical disk industry, Rosenkopf and Nerkar (2001) found that firms' boundary-spanning search efforts impacted subsequent technological evolution. Additionally, Baum et al. (2000) provided evidence that vicarious and experiential learning through local search predicted the spatial expansion of nursing home chains over time. Learning from experimental failures can also result in higher quality technological output as Khanna et al. (2016) found in their study of 97 pharmaceutical firms between 1980-2002. In summary, organizations gain insights into possible avenues for renewal through exploring available options, incorporating new knowledge into their strategic repertoire, and taking actions to reinforce their chosen path.

Yet due to the bounded rationality of organizations (Simon, 1959), exploratory endeavors may have limitations when resources become constrained and overwhelmed

by excessive strategic renewal options and initiatives. Collective learning “involves developing enough consensus around...diverse interpretations for organized action to result” (Fiol, 1994: 403). When faced with too many new interpretations of potential strategies, organizational constituents may experience information overload (Huber, 1991). Intuiting, interpreting, and integrating new learnings into an organization requires time, adaptability, and resilience. For example, Greve (1998) examined a nine-year period in which U.S. radio broadcasting firms carefully experimented with and selected among a multitude of risky format, content, technology, and production changes by considering performance feedback amidst historical and social aspiration levels. Additionally, Hayward (2002) assessed an eleven-year timeframe in which firms prudently applied specific knowledge of prior acquisitions associated with small losses to determine appropriate timing and industrial similarity of subsequent acquisitions. Ultimately, organizations have limited cognitive resources to pursue various options for strategic renewal thus reaching an inflection point in gains received from exploration.

Continuing exploratory learning activities past the inflection point may result in diminishing returns to strategic renewal efforts. Firms targeting an inappropriate scope of markets may fail to gain and maintain a competitive advantage (Porter, 1985). Furthermore, lacking focus may result in detrimental effects of overdiversification (Hoskisson, Hoskisson, Hitt, & Paul, 1994). Recommencing endless search, experimentation, and variation undermines the intentionality of altering path dependence as the organization may be less likely to coalesce around a single direction for successful

strategic renewal. While long-term performance is impacted by conscientiously evaluating available strategic alternatives (Zajac & Shortell, 1989), persistent exploration may preclude market success (Dowell & Swaminathan, 2006). Learning through exploration should be a deliberate endeavor in support of strategic change rather than an interminable accumulation of knowledge (Zollo & Singh, 2004). Continuing to expend resources on exploring new knowledge forestalls the focused effort required for strategic renewal. In conclusion, an organization's exploratory initiatives contribute to strategic renewal by inviting opportunities and impetus for change, yet continued exploration without intentional focus on a renewed strategic direction may detract from the organization's transformational path. Therefore, I hypothesize that:

H1: There will be an inverted U-shaped relationship between exploration and strategic renewal.

Organizational ambidexterity refers to the ability of an organization to balance exploration and exploitation (see Andriopoulos & Lewis, 2009; O'Reilly III & Tushman, 2013; Raisch, Birkinshaw, Probst, & Tushman, 2009). Capitalizing on existing knowledge through exploitation involves refinement, efficiency, implementation, and execution (March, 1991). While organizations can exploit current knowledge and explore new knowledge simultaneously, they are subject to myopic learning traps of overlooking distant times, places, and failures (Levinthal & March, 1993) and pathological proclivities for mature, familiar, and near-to-existing solutions that may inhibit breakthrough inventions (Ahuja & Katila, 2001). A tendency to overinvest in

exploitation of what is already known may detract from exploratory learning efforts necessary for successful strategic renewal.

Feedback loops are vital for organizational learning to result in strategic renewal (Crossan & Berdrow, 2003; Crossan et al., 1999). Yet, the bounded rationality of organizations (Simon, 1959) may also put undue pressure on managerial cognition to effectively process feedback and appropriately direct resources toward exploiting prior knowledge or exploring new knowledge in line with strategic renewal goals. Fang, Lee, and Schilling (2010) simulated how current knowledge rapidly diffused across subgroups enabling exploitation while parallel, isolated learning within each subgroup facilitated exploration. Additionally, Zhou and Wu (2010) found that technological capability of Chinese electronics, IT, and telecommunications firms fostered exploitation at an accelerating rate while impeding explorative innovation. These studies support the idea that organizations may easily fall into exploitative competency traps of continuing to utilize suboptimal routines (Levitt & March, 1988).

Thus, facing a dilemma of productivity (Benner & Tushman, 2003), firms may continue to reinforce existing knowledge through refinement, efficiency, implementation, and execution rather than generate new knowledge through search, innovation, experimentation, and variation. The limited cognitive and material resources available to the organization and tendency to engage in familiar versus uncertain terrains may undermine the propitious pursuit of strategic renewal. Therefore, I hypothesize that exploitation dampens the curvilinear effect of exploration on strategic renewal.

H2: Exploitation weakens the inverted U-shaped relationship between exploration and strategic renewal.

Internal feedback loops may be necessary for organizational learning to result in successful strategic renewal, yet the organization may receive feedback from the external environment as well (Crossan & Berdrow, 2003). In a survey of U.S. biotechnology and pharmaceutical firms, Muthusamy and White (2005) found that reciprocal commitment, interfirm trust, and mutual influence contributed to a greater degree of knowledge transfer in strategic alliances, exemplifying the social exchange nature of interorganizational learning. Additionally, external feedback may provide legitimacy to firms exploring new organizational forms (McKendrick, Jaffee, Carroll, & Khessina, 2003), entrepreneurial opportunities (Hiatt et al., 2009), or multi-category industry membership (Ruef & Patterson, 2009).

External feedback provides supplementary input for organizations to consider when pursuing strategic renewal. Technological innovations are often considered to be successful when adopted by external constituents (Utterback & Abernathy, 1975). External firms can adopt dominant technological designs to remain competitive in an industry (Suarez & Utterback, 1995), tying back knowledge dependence to the originating firm (Howard, Withers, & Tihanyi, 2017). While the subsequent adoptions legitimize the originating firm's technologies, it poses a dilemma for the firm concerning new innovations—whether resources should be directed toward incremental

improvements of incumbent products or toward new, potentially disruptive technologies (Christensen, 2013).

Consequently, an incumbent firm may become bound to the validation from outside adoptions and its operations dependent on core capabilities. Focusing on successfully adopted technology may preclude exploration necessary to steer the firm toward the next generation of technological advancement (Christensen, 1992b; Christensen, 1992a; Henderson & Clark, 1990). A firm's adaptive capabilities hinge on channeling and distributing the appropriate attention to strategy formulation and implementation (Ocasio, 1997). External feedback in the form of adoptions may obscure the ability of the organization to focus on changing the strategic direction when necessary. Therefore, I hypothesize that adoption has a negative effect on the curvilinear relationship between exploration and strategic renewal.

H3: External adoption of core knowledge weakens the inverted U-shaped relationship between exploration and strategic renewal.



Figure 3: Organizational Learning and Strategic Renewal

Methodology

Data Sources and Sample

Core data on public firms in the United States was collected from PatentsView.org and CompuStat. PatentsView provides patent information from the U.S. Patent and Trademark Office dating back to 1975. CompuStat contains financial, statistical, and market information for companies dating back to 1962. According to the National Bureau of Economic Research, variance in intellectual property appropriability exists across industries; not all manufacturing firms protect innovation assets with patents, preferring secrecy, lead time advantages, and/or complementary marketing and manufacturing capabilities. Yet, for some industries, registered patents are pertinent for preventing rivals from copying technologies, inhibiting competitors from patenting related inventions, retaining leverage in negotiations, and legally protecting intellectual property (Cohen, Nelson, & Walsh, 2000). Therefore, I selected the communications equipment manufacturing industry in which firms are more likely to generate certified records of innovation by registering patents with the U.S. Patent and Trademark Office. The final sample included 163 firms in SICs 3661, 3663, and 3669 with a total number of 76,208 patents between the years 1975 to 2020.

Dependent Variable

The dependent variable is *strategic renewal*. Prior studies of strategic renewal have been qualitative with only two studies using a quantitative representation, not based on patent information. Kim and Pennings (2009) investigated imitation in the tennis

industry by counting the number of new racket designs introduced by competitors of an innovating company while Kwee et al. (2011) constructed ratios of coded exploitative and explorative strategic renewal actions performed by Royal Dutch Shell. Neither measure represents the change in knowledge of a firm during strategic renewal endeavors.

Prior management research has used USPTO information to reflect aspects of firm knowledge, learning, and innovation. Each successful patent application contains major component (main classes) delineating technology subject matter divisions and minor components (subclasses) indicating processes and features. Main classes and subclasses have been used to represent knowledge elements in a firm's technological portfolio (e.g., Basu, Sahaym, Howard, & Boeker, 2015; Fleming & Sorenson, 2001, 2004; Vagnani, 2015). Additionally, a number of prior management studies on alliances have measured the technological distance between two firms (e.g., Colombo, 2003; Phelps, 2010; Rosenkopf & Nerkar, 2001; Vasudeva & Anand, 2011), based on the calculation of firm technological position and angular proximity originated by Jaffe (1986). Tzabbar (2009) used a similar angular distance measure for incremental changes in firm technological position with the addition of each new patent in the biotechnology industry. Since strategic renewal represents change in the technological knowledge of the firm, the distance of interest is between the firm's technological portfolio at two different points in time. Therefore, I constructed the measure as follows.

For strategic renewal, the angular distance of interest is between a firm's technological portfolio at time t and its previous portfolio at $(t-5)$. A period of five years was chosen based on qualitative and single-firm studies indicating that strategic renewal takes a period of at least several years (e.g., Agarwal & Helfat, 2009; Ben-Menahem et al., 2013; Crossan & Berdrow, 2003) as well as the average time of 25 months to get a patent approved according to the USPTO. The angle is calculated as $\theta = \cos^{-1}[(\mathbf{a} \times \mathbf{b}) / (||\mathbf{a}|| \times ||\mathbf{b}||)] = \cos^{-1}[(\mathbf{a}_1 \times \mathbf{b}_1 + \mathbf{a}_2 \times \mathbf{b}_2 + \dots + \mathbf{a}_k \times \mathbf{b}_k) / (||\sqrt{(\mathbf{a}_1^2 + \mathbf{a}_2^2 + \dots + \mathbf{a}_k^2)}|| \times ||\sqrt{(\mathbf{b}_1^2 + \mathbf{b}_2^2 + \dots + \mathbf{b}_k^2)}||)]$ where vector \mathbf{a} is the firm's technological position at time t and vector \mathbf{b} is the firm's technological position at time $(t-5)$ (Tzabbar, 2009). The angle is converted to a scalar technological distance between the firm at times t and $(t-5)$ in coordinate notation as $1 - P_{(t)(t-5)}$ where $P_{(t)(t-5)} = \Sigma F_t F_{t-5} / [\sqrt{\Sigma F_t^2} \sqrt{\Sigma F_{t-5}^2}]$. The vector F is represented by $(F_1 \dots F_k)$ where F_k is the proportion of patents assigned to class k in the previous five years, and the summations are of the coefficients from 1 to k (Jaffe, 1986, 1989; Vasudeva & Anand, 2011). The resulting strategic renewal measure ranges from a minimum value of 0 for no changes to the technology portfolio to a maximum of 1 indicating that the firm completely changed its patent knowledge areas between times t and $(t-5)$. For angular distance values between 0 and 1, a higher number indicates that the sampled firm has taken a substantially different technological direction since the previous period while a lower number implies that the sampled firm has maintained a technological portfolio more consistent with its previously established path. Strategic renewal in my sample had a mean value of 0.381 with a standard deviation of 0.353.

Independent Variables

Firm innovation reflects the recombinant nature of knowledge (Kaplan & Vakili, 2015; Kogut & Zander, 1992). Patent main class or subclass combinations can represent novelty, repurposing, and utilization of knowledge for exploration, exploitation, and adoption, respectively. Exploration is the creating of technological knowledge by a firm that is novel relative to its existing knowledge stock while exploitation is the extent to which a firm draws on knowledge elements previously used (Ahuja & Katila, 2001; Benner & Tushman, 2002; Phelps, 2010; Rosenkopf & Nerkar, 2001). Because patent citations may not accurately depict external adoption of knowledge (Alcácer & Gittelman, 2006), I also created a new measure for adoption representing the extent to which external firms utilize knowledge elements originated by the focal firm.

Based on prior studies, I constructed measures of new knowledge creation, internal repurposing by the focal firm, and external utilization by industry firms within five-year windows from an observation year (e.g., Basu et al., 2015; Vasudeva & Anand, 2011). The independent variables were constructed using pairs of main classes to represent a knowledge element. Though exploration, exploitation, and adoption have not previously been operationalized in this way, this approach reflects the recombinant nature of knowledge by representing elements that have been newly created by the focal firm, used before by the focal firm, and used by other firms externally. The independent variable *exploration* is the number of patents using combinations that are new to the firm during the five years prior to the observation year divided by the total number of patents

in the prior five years. The exploration measure represents the degree of novelty per patent in each observation year per firm. Exploration ranged from 0 to 36 with a mean value of 0.57 and a standard deviation of 1.37. The moderating variable *exploitation* is the number of patents attained by the firm using prior combinations during the five years prior to the observation year divided by the total number of patents in the prior five years. The exploitation measure represents the degree to which the firm reused existing knowledge per patent in the observation year. Exploitation ranged from 0 to 15.36 with a mean value of 0.55 and a standard deviation of 1.27. The moderating variable *adoption* is the number of patents by other firms using the focal firm's original combinations during the five years prior to the observation year divided by the total number of patents in the prior five years. The adoption measure represents the degree to which external firms used the focal firm's original knowledge per patent in the observation year. Adoption ranged from 0 to 341.29 with a mean value of 1.53 and a standard deviation of 15.10.

Control Variables

I controlled for factors that may impact technology strategy and firm innovation in order to isolate the effects of explanatory variables. The ability of a firm to change the composition of its knowledge base may be related to resources available. Therefore, I controlled for *R&D expenditures*, *ROA*, *firm age*, *number of inventors*, and *knowledge quality*. Research and development spending was obtained from CompuStat and Mergent Online. Research and development spending ranged from \$0 to \$18,752M with a mean

value of \$91.36M and a standard deviation of \$696.69M. Return on assets was calculated as net income divided by total assets, obtained from CompuStat and Mergent Online as well. ROA ranged from -\$99.92M to \$4.64M with a mean value of -\$0.20M and a standard deviation of \$2.05M. Firm age was calculated as the difference between the current year and the year the firm was founded. Founding years were obtained from multiple sources including Ritter IPO, Reference Solutions, Mergent Online, OpenCorporates.com, SEC.gov, and internet searches. Firm age ranged from 0 to 151 with a mean value of 23.28 and a standard deviation of 21.74. The number of inventors was captured from USPTO patent records by counting the number of active inventors on patents in each observation year. Number of inventors ranged from 0 to 3,469 with a mean value of 13.94 and a standard deviation of 127.49. Knowledge quality is the sum of external citations across all firm patents with patent application dates up to five years before the observation year (Lanjouw & Schankerman, 2004; Miller, Fern, & Cardinal, 2007), reflecting the impact of the firm's innovation. Knowledge quality ranged from 0 to 15,162 with a mean value of 57.33 and a standard deviation of 572.37.

Analysis and Results

The continuous dependent variable was regressed on the independent variables using panel OLS in Stata 17. Table 1 shows a summary of all variables, and Table 2 shows the correlations for the dependent, independent, moderating, and control variables. The dependent variable strategic renewal was regressed on the independent

and moderating variables and the variance inflation factors calculated as 1.05, 1.05, and 1.00 for exploration, exploitation, and adoption, respectively, indicating no multicollinearity among the variables.

Table 1: Summary Table for Study 1

	Mean	SD	Min	Max
1. Strategic Renewal	0.38	0.35	0.00	1.00
2. Exploration	0.57	1.37	0.00	36.00
3. Exploitation	0.55	1.27	0.00	15.46
4. Adoption	1.53	15.10	0.00	341.29
5. R&D Expenditures	91.36	696.69	0.00	18752.00
6. ROA	-0.20	2.05	-99.92	4.64
7. Firm Age	23.28	21.74	0.00	151.00
8. Number of Inventors	13.94	127.49	0.00	3469.00
9. Knowledge Quality	57.33	572.37	0.00	15162.00

Table 2: Correlation Table for Study 1

	1	2	3	4	5	6	7	8	9
1. Strategic Renewal	1.0000								
2. Exploration	0.2639*	1.0000							
3. Exploitation	-0.1189*	0.1310*	1.0000						
4. Adoption	-0.0021	-0.0000	0.0453*	1.0000					
5. R&D Expenditures	-0.1370*	-0.0589*	0.0854*	0.0467*	1.0000				
6. ROA	-0.0005	-0.0367	-0.0046	0.0139	0.0152	1.0000			
7. Firm Age	-0.0645*	-0.0858*	0.0471*	0.3085*	0.1454*	0.0629*	1.0000		
8. Number of Inventors	-0.1620*	-0.0480*	0.0593*	0.0122	0.7401*	0.0183	0.1803*	1.0000	
9. Knowledge Quality	-0.1460*	-0.0415*	0.0481*	-0.0088	0.4229*	0.0161	0.1900*	0.8176*	1.0000

* $p < .05$

Table 3 shows the results of the regression models. Model 1 regressed strategic renewal on the control variables research and development expenditures, return on assets, firm age, number of inventors, and knowledge quality. Model 2 regressed strategic renewal on the independent variable exploration and the square of exploration.

The linear term is positive and significant ($\beta = 0.282, p = 0.000$) and the squared term is negative and significant ($\beta = -0.060, p = 0.000$) indicating an inverted U-shaped relationship. Hypothesis 1 is supported; there is an inverted U-shaped relationship between exploration and strategic renewal such that exploration is positively related to strategic renewal until an inflection point at which higher levels of exploration is negatively related to strategic renewal.

Model 3 shows the moderating effect of exploitation on the inverted U-shaped relationship between exploration and strategic renewal. The linear term of exploration is positive and significant ($\beta = 0.242, p = 0.000$) and the square term of exploration is negative and significant ($\beta = -0.051, p = 0.000$) indicating that exploration and strategic renewal has an inverted U-shaped relationship. The moderating terms of exploitation X exploration and exploitation X exploration squared are both significant ($p = 0.000, p = 0.010$, respectively) indicating that exploitation moderates the inverted U-relationship between exploration and strategic renewal. Figure 4 portrays the moderating effect of exploitation at low exploitation at the mean minus one standard deviation ($0.5530 - 1.2750$) and high exploitation at the mean plus one standard deviation ($0.5530 + 1.2750$). Exploitation moderates the relationship between exploration and strategic renewal such that the inverted U-shaped relationship is flatter and broader at low levels of exploitation and steeper and narrower at high levels of exploitation. Exploitation appears to weaken the inverted U-shaped relationship by shifting the curve down such that lower levels of strategic renewal are achieved. At the point where the two curves are closest, the 95%

confidence intervals for low exploitation is [0.5651, 0.8107] and high exploitation is [-.0639, 1.3157]. Hypothesis 2 is marginally supported.

Model 4 shows regression of the moderating variable external adoption of the firm's core knowledge on the relationship between exploration and strategic renewal. There is no significant effect of adoption ($p = 0.871$) on the inverted U-shaped relationship between exploration and strategic renewal. Hypothesis 3 is not supported. External feedback from adopting firms does not appear to impact the relationship between exploration and strategic renewal.

Table 3: Results for Study 1

	Model 1 (controls only)			Model 2			Model 3			Model 4		
	β	SE	p-value	β	SE	p-value	β	SE	p-value	β	SE	p-value
Independent Variable												
Exploration				0.282	0.032	0.000	0.242	0.344	0.000	0.280	0.032	0.000
Exploration Squared				-0.060	0.012	0.000	-0.051	0.013	0.000	-0.059	0.012	0.000
Moderating Variables												
Exploitation							-0.132	0.016	0.000			
Exploitation X Exploration							0.096	0.250	0.000			
Exploitation X Exploration Squared							-0.021	0.008	0.010			
Adoption										-0.001	0.001	0.554
Adoption X Exploration										0.002	0.006	0.745
Adoption X Exploration Squared										-0.001	0.008	0.871
Control Variables												
R&D Expenditures	0.000	0.000	0.992	0.000	0.000	0.743	0.000	0.000	0.320	0.000	0.000	0.765
ROA	0.005	0.003	0.102	0.005	0.003	0.054	0.005	0.003	0.057	0.005	0.003	0.053
Firm Age	-0.005	0.001	0.000	-0.005	0.001	0.000	-0.003	0.001	0.001	-0.005	0.001	0.000
Number of Inventors	0.000	0.000	0.890	0.000	0.000	0.813	0.000	0.000	0.910	0.000	0.000	0.822
Knowledge Quality	0.000	0.000	0.450	0.000	0.000	0.549	0.000	0.000	0.378	0.000	0.000	0.508
Constant	0.529	0.031	0.000	0.434	0.031	0.000	0.458	0.031	0.000	0.433	0.032	0.000
R-Squared Within	0.0504			0.1135			0.1549			0.1134		
R-Squared Between	0.0206			0.0039			0.027			0.0041		
R-Squared Overall	0.0017			0.0713			0.114			0.0726		
Number of Observations	1434			1434			1434			1434		

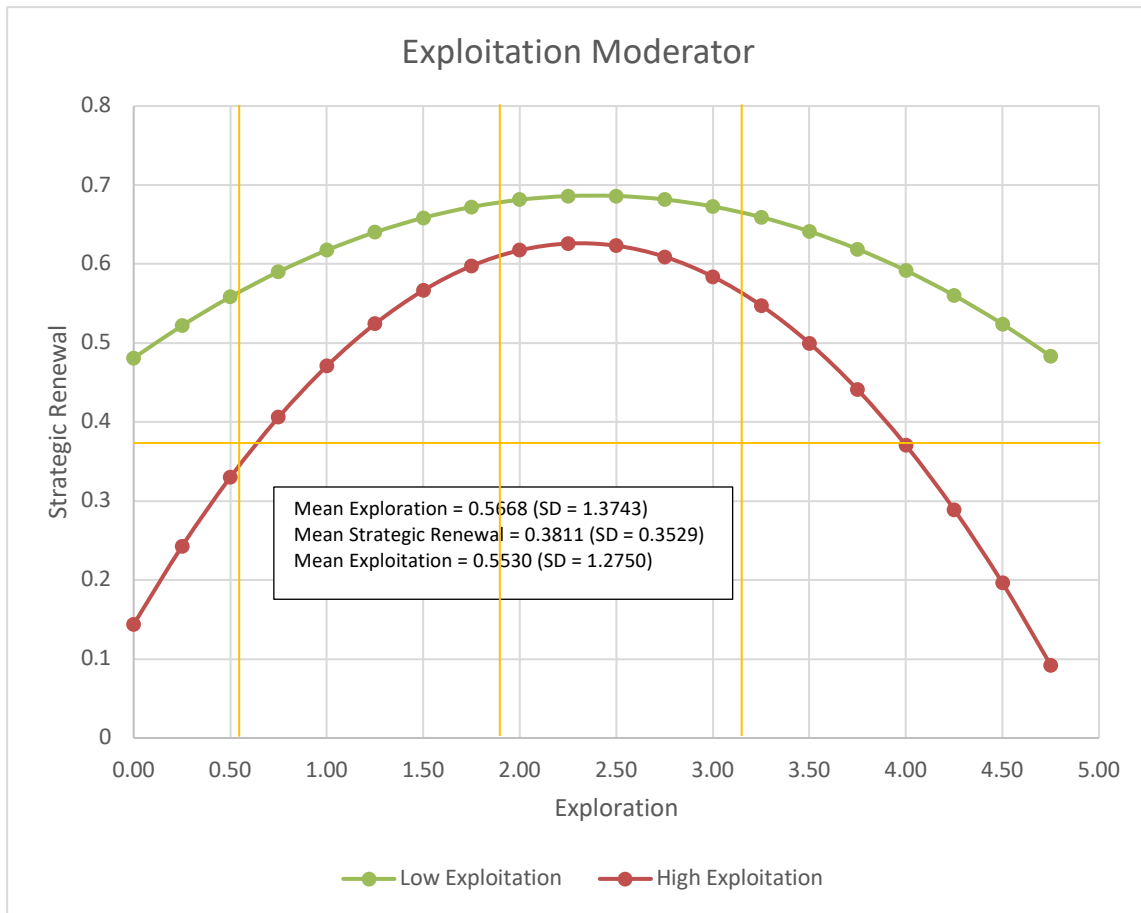


Figure 4: Exploitation Moderates the Relationship between Exploration and Strategic Renewal

Discussion

Strategic renewal involves purposeful redirection of the firm’s goals and objectives (Huff et al., 1992; Schmitt et al., 2018). Organizational learning precedes strategic renewal as the firm ambidextrously balances exploring new knowledge and exploiting existing knowledge (Volberda et al., 2001). In this study, I demonstrate in a technological innovation context how firms strategically modify their knowledge bases

through simultaneous processes of knowledge creation and knowledge utilization, finding support for hypothesized predictions that exploratory activities are beneficial for strategic renewal up to an inflection point at which too much exploration hinders renewal efforts and that exploitative activities may detract from the level of overall strategic renewal achieved.

Thus, as firms aim to achieve and sustain competitive advantages in the marketplace, they must concomitantly attain new growth through innovative pursuits and reposition core operations to sustain the business during strategic renewal.

Transformation of the firm's knowledge involves not only the underlying research and development of technologies but also transitioning the associated internal manufacturing, production, and administrative activities and external sales, marketing, and service functions over time—the entire firm is involved in strategic renewal.

Balancing the new and the old is the key to business transformation. Successful strategic renewal is exemplified in long-standing innovative firms such as 3M—transitioning from sandpaper and grinding wheels in the early 1900s to a globally diversified products in safety, industrial, transportation, electronics, healthcare, and consumer markets today—, and IBM—originating dial recorders and tabulating machines in the early 1900s to dominating personal computers and rack servers in the 1980s and more recent leadership in cloud software, artificial intelligence, and consulting services.

More contemporary firms pursue strategic renewal at an even more accelerated pace and achieve even greater gains in today's digital economy. Netflix grew 59%

between 2012 and 2019 (Anthony, Trotter, & Schwartz, 2019) with its transition from DVD movie delivery to original content creation and hosting services that revolutionized the way people watch television. Amazon had 39% CAGR between 2009 and 2019 (Anthony et al., 2019) as it expanded from selling books online to broadening its product delivery offerings to virtually any hard good yet also enacting its information technology expertise to become the leading on-demand cloud computing platform with Amazon Web Services. In strategic renewal, firms traverse new territory while also making the most of existing core competencies such as 3M's manufacturing capabilities, IBM's technological prowess, Netflix's experience in the entertainment industry, and Amazon's broad reach. Through an appropriate balance of exploration in new realms and exploitation of existing proficiencies, organizational learning enables transformative change (Brown & Starkey, 2000; McNamara & Baden-Fuller, 1999). The relationship between organizational learning and strategic renewal has important theoretical and managerial implications.

Theoretical Implications

Research in strategic renewal has probed learning antecedents such as ambidexterity (Kwee et al., 2011; Volberda et al., 2001), absorptive capacity / dynamic capabilities (Ben-Menahem et al., 2013; Burgers et al., 2009), and types of knowledge such as executive experience (Williams et al., 2017) and occupational functions (Pettit & Crossan, 2020). However, the research has neglected the intricacies of exactly *what* is being renewed during strategic renewal and *how* firms pursue this major transformation.

In this study, I extend our understanding of how learning, change, and knowledge are interrelated during strategic renewal activities through the mechanism of innovation. I contribute to strategic renewal and organizational learning literature in three important ways.

First, I demonstrate how innovation enables the activities necessary for the firm to change its strategic intent and capabilities by inherently reshaping the foundation of knowledge upon which the firm conducts business. Firms modify their technological knowledge bases through intuiting new possibilities and interpreting feasibility then integrating new information with existing operations to institutionalize the new realm. Second, I establish the limitations of exploratory endeavors providing benefits to strategic renewal. Firms may explore new knowledge areas up to an inflection point at which further exploration hinders renewal efforts due to bounded rationality of management and balancing resources to support new and existing programs. Third, I proffer the moderating effect of exploitation on the relationship between exploratory activities and strategic renewal. Exploiting existing knowledge may stave off exploring new knowledge such that the firm does not achieve a substantial change in its strategic intent and capabilities.

Managerial Implications

To extend the longevity of the firm, managers may pursue new and different avenues for offering products and services to the marketplace. Through the learning process, the firm searches for new possibilities, evaluates the feasibility of changes,

develops a course of action, and undertakes new endeavors while also sustaining some existing operations to support the transition. The findings in this study are important for managers to understand how the knowledge that the organization creates, maintains, and utilizes impacts the potential for the firm to achieve a new strategic direction.

First, prior to pursuing strategic renewal, management should evaluate the current state of the organization's knowledge and innovative capabilities. Firm leadership should understand the composition of the existing knowledge portfolio, the desired end state, the gap between the two, and the ability of organizational resources to meaningfully close the gap. Second, management needs to pay close attention to the amount of exploration that the firm attempts during strategic renewal. While creating new knowledge may aid in transforming the firm's knowledge portfolio, engaging in too much exploration may spread resources too thin, overdiversify into unprofitable areas, and detract from a concerted effort toward specified objectives. Finally, firm management must carefully balance exploitation while pursuing strategic renewal. Leaning on existing knowledge may help bolster operations during the transformation but relying too heavily on incumbent products and services may prevent the firm from achieving the substantial pivot that is desired.

CHAPTER V

STUDY 2: UNLEARNING AND STRATEGIC RENEWAL

Organizational learning has been established by scholars as an important antecedent of strategic renewal (Crossan & Berdrow, 2003; Crossan et al., 1999; Crossan et al., 2011; Jones & Macpherson, 2006; Pettit & Crossan, 2020; Schmitt et al., 2018). Inherent in organizational learning's contribution to consecutive changes in strategy is the ambidexterity of the firm in exploiting current knowledge and exploring new avenues of knowledge. Yet, the capacity of a firm's knowledge stock may be limited (Cohen & Levinthal, 1990), and the firm is faced with the need to *unlearn* some knowledge in order to focus on maximizing utility of current knowledge and absorbing new knowledge (Huber, 1991). Therefore, I suggest that *unlearning* is also an important contributor to a firm's transformation of intent and capabilities through strategic renewal. First, I review extant literature about organizational unlearning. Second, I hypothesize theoretical linkages between unlearning and strategic renewal through the lenses of knowledge and innovation. Third, I execute an empirical study to test these relationships in technology contexts using patent data of 163 public firms in the communications equipment manufacturing industry between 1975 and 2020.

Theory and Hypotheses

Organizational Unlearning

Psychologist Jean Piaget (1968) described learning as a continuous genesis, a process of creation and recreation in which logical structures and gestalts are added and deleted from memory over time. Extending this concept to organizations, Hedberg (1981: 3) suggests, “Knowledge grows, and simultaneously it becomes obsolete as reality changes. Understanding involves both learning new knowledge and discarding obsolete and misleading knowledge. The discarding activity—unlearning—is as important a part of understanding as is adding new knowledge. In fact, it seems as if slow unlearning is a crucial weakness of many organizations.” Furthermore, Hedberg (1981: 18-19) states, “Unlearning makes way for new responses and mental maps....Balances between organizations’ abilities to learn and to unlearn appear necessary for long-term survival.” Applying Pavlov’s (1928) stimulus-response framework and Parsons’ (1951) theory of action, Hedberg explains organizational unlearning in three modes of operation: 1) disconfirmation of mechanisms for selecting and identifying stimuli; 2) disconfirmation of connections between stimuli and responses; and 3) disconfirmation of connections between responses. In this manner, unlearning can be seen as disassembling an organization’s perceptions of reality, disengaging actions within its former reality, and disorienting reactions in its new reality.

While Hedberg's notions formed the foundation for thinking about organizational unlearning, organizational management scholars have not postulated a cohesive theory. Early deliberations focused on the influence of top managers and individuals on organizational unlearning. Nystrom and Starbuck (1984) advised that in order for organizations to avoid crises, executives need to continuously unlearn by listening to dissents, exploiting opportunities to garner new experiences, and increasing experimentation. By rectifying errors in their own beliefs and perceptions, top managers may help avert organizational calamities before they occur. Additionally, Klein (1989) proposed that unlearning occurs when knowledge is changed in one of four ways: 1) extinction – removing undesirable knowledge from individuals; 2) replacement – disseminating new knowledge to individuals; 3) exorcism – removing inappropriately-behaving individuals from the organization; or 4) salvation – replacing inappropriately-behaving individuals with a “mythical manager-savior”. These initial perspectives posit that the onus of unlearning is on individuals within the organization, yet insights from macro scholars provide more cues for organization-level unlearning.

In his evaluation of organizational learning literature, Huber (1991) suggests that unlearning is subsumable under learning—entities acquire knowledge recognized as potentially useful then may intentionally discard, forget, or disregard portions of this knowledge. With this decrease in the range of potential behaviors, unlearning implies that the organization may become inactive in the context where the knowledge had previously been used. Moreover, in their review of organizational memory research,

Walsh and Ungson (1991) claim that the best way for entities to unlearn stored information is through retroactive interference—inhibiting the access of previously learned knowledge by learning new knowledge. In this way, organizational unlearning takes place when encased learnings are no longer retrieved because cultural, transformational, structural, and ecological facilities have been filled with new behavioral perspectives. Bettis and Prahalad (1995) support the idea that organizational unlearning is synonymous with forgetting. In their theory, the dominant logic of a firm puts constraints on organizational intelligence; firms must (at least partially) unlearn existing strategies in order to replace them with new ones. The authors refer to the classic case of IBM's impending doom when ingrained in the dominant logic of producing mainframe computers as the industry shifted to desktop computing.

At this point in the literature, scholarly conversations about organizational unlearning left mainstream management journals in pursuit of more specific connections with innovation and technology (Becker, 2010; Leal-Rodríguez, Eldridge, Roldán, Leal-Millán, & Ortega-Gutiérrez, 2015; Starbuck, 1996), exploration and exploitation (Blaschke & Schoeneborn, 2006; McNamara & Baden-Fuller, 1999), knowledge management (De Holan & Phillips, 2004; Tsang, 2008; Turc & Baumard, 2007; Zhao, Lu, & Wang, 2013), and organizational change (Akgün Ali, Byrne John, Lynn Gary, & Keskin, 2007; Azmi, 2008; Tsang & Zahra, 2008). More recently, Howells and Scholderer (2016) sparked controversy with their review and critique of organizational unlearning literature in which they advocated that management scholars should “forget

unlearning”. Tsang (2017a) sharply defended against this attack and incited renewed interest in the theoretical construct of organizational unlearning. Primary pontifications have been written in *The Learning Organization* by seasoned scholars around the globe in the past few years, publishing a special issue dedicated to organizational unlearning. With additional recent works by scholars in change management and knowledge management arenas, we approach a more consistent macro perspective of organizational unlearning.

Organizational unlearning is defined as “discarding of old routines to make way for new ones, if any” (Tsang & Zahra, 2008: 1437); it is an explicit action—intentional casting off, casting aside, rejecting, abandoning, or giving up knowledge rather than implicitly forgetting or failing to remember (Nguyen, 2017). Unlearning is a distinct process from learning that involves destabilizing established routines, discontinuing old behaviors, and releasing prior understandings (Fiol & O’Connor Edward, 2017; Fiol & O’Connor, 2017; Kluge, Schöffler Arnulf, Thim, Haase, & Gronau, 2019; Tsang, 2017b). Unlearning is necessary for organizational adaptation—organizations must shed obsolete knowledge in order to change (Nguyen, 2017). Furthermore, firms may promote an intentional unlearning cycle in order to renew core strategies (Cegarra-Navarro & Wensley, 2019; Starbuck, 2017). Fundamentally, organizational unlearning is a key component of strategic metamorphosis that builds resilience and extends chances of success and survival (Klammer & Gueldenberg, 2019; Morais-Storz & Nguyen, 2017). These recent reflections after nearly 40 years of theorization motivate the need to

further understand the relationship between organizational unlearning and strategic renewal.

Organizational Unlearning and Strategic Renewal

Through strategic renewal, firms can alter their path dependence by transformation of their strategic intent and capabilities (Huff et al., 1992; Schmitt et al., 2018). While organizational learning enables the development of new competencies necessary for strategic renewal (Crossan & Berdrow, 2003; Crossan et al., 1999; Crossan et al., 2011), firms may need to undertake simultaneous unlearning procedures to buttress renewal initiatives. Imai, Nonaka, and Takeuchi (1985) observed Japanese companies unlearning past product development lessons as they engaged in a continuous process of creative destruction (Schumpeter, 1934). Fuji-Xerox reduced manpower required, shortened development cycles, and eliminated the prototype phase while Epson aimed to have next generation models already in test production at the same time a new product was being introduced to the market. Additionally, Honda opted to develop a totally new concept of cars rather than modify their existing line of Civics.

In order to pursue a new strategic direction, firms must focus their limited cognitive and material resources appropriately. Prior knowledge and established mental models may hinder change efforts (Becker, 2010, 2018) as they may be ineffective, misleading, or obsolete in the new operating realm. Understanding how constraints may arise in the existing stock of knowledge and capabilities is key to successful strategic renewal (Capron & Mitchell, 2009). By releasing knowledge that no longer provides

benefits, firms make room for new knowledge that supports their desired future state (Hedberg, 1981). For example, Khanna et al. (2016) found that pharmaceutical firms achieved greater innovative quality and output when they discontinued patents that they believed had limited future value. Thus, letting go of old technologies, processes, and procedures reinforces the firm's transformation into a renewed state. The more unlearning a firm undertakes, the greater the impact on strategic renewal.

While unlearning promotes changing cognitive structures and freeing up capacity to appropriately reorient the firm's strategic direction (Nystrom & Starbuck, 1984), the process of releasing inapplicable knowledge must not be done precariously. Largely "a function of a firm's level of prior related knowledge", absorptive capacity is "the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends...critical to its innovative capabilities" (Cohen & Levinthal, 1990: 128). Firms successfully innovate through the integration and recombination of knowledge (Grant, 1996; Kogut & Zander, 1992; Spender & Grant, 1996). Thus, the firm must retain some knowledge that facilitates its renewed strategic intent while carefully determining and releasing only the elements that impede its imminent transformation. Consequently, the positive effect of unlearning on strategic renewal reaches a boundary.

Continued unlearning past the inflection point may result in irreversible deficits to the firm's knowledge and capabilities. Firms must decipher usefulness of knowledge and capabilities rather than reckless abandonment to ensure that important elements are

retained. Zahra and George (2002) suggest that converting potential absorptive capacity to realized absorptive capacity enables the firm to achieve competitive advantages of flexibility, innovation, and performance. Depleting capabilities contributing to the acquisition and assimilation of knowledge (potential absorptive capacity) may obstruct the firm's propensity to change directions while exercising established transformation and exploitation experience (realized absorptive capacity) may nullify the firm's previously achieved legitimacy in the marketplace. Ultimately, too much unlearning leaves the firm defunct of knowledge necessary to operate much less pursue a renewed strategy. In summary, releasing ineffective, misleading, or obsolete knowledge can stimulate strategic renewal to a degree, but unscrupulous unlearning hampers the likelihood that the firm will successfully transform. Therefore, I hypothesize that:

H1: There will be an inverted U-shaped relationship between unlearning and strategic renewal.

Exploitation of the firm's existing strengths may act as a filter to make unlearning more efficient for strategic renewal. As described by March (1991: 71), exploitation in organizational learning "includes such things as refinement, choice, production, efficiency, selection, implementation, execution." In other words, exploitation refers to actions organizations and firms undertake to utilize and benefit from existing knowledge and resources. Furthermore, institutionalized learning is communicated through feedback loops to reinforce effective routines, systems, rules, and procedures while the firm pursues strategic renewal (Crossan & Berdrow, 2003; Crossan

et al., 1999). This feedback may enable a firm to understand the value of current knowledge, parse out knowledge that no longer pertains to its new strategic intent and capabilities, and sustain operations while unlearning.

Strategic renewal requires deliberate changes to the organization over a period of time to restructure, reanimate, or rejuvenate its knowledge and capabilities (Baden-Fuller & Volberda, 1996). While unlearning unnecessary competencies for strategic renewal, the organization continues to exploit competencies that do provide value. For example, Cattani (2005) investigated the “preadaptation” of firms involved in the evolution of the fiber optics industry between 1970-1995—firms such as Corning and AT&T Bell Laboratories exploited previously developed technological skills and knowledge by transferring them from obsolete applications to new uses in fiber optic telecommunications. Additionally, Benner and Tripsas’s (2012) study of the evolution of digital cameras highlighted how firms such as Canon, Sony, and Toshiba capitalized on proficiencies from prior industries (film photography, consumer electronics, and computing, respectively) to enter into the new arena of digital photography.

Thus, the processes of refining, selecting, and implementing useful knowledge through exploitation help determine the ineffective, misleading, or obsolete knowledge that must be shed through unlearning. Directing the organization’s focus on its dominant strengths will uncover its hidden weaknesses. Recognizing and reinforcing existing knowledge that will continue to provide value during the transition to, and potentially within, the organization’s renewed strategy endorses efforts to release skills, capabilities,

and competencies that will no longer provide benefits. Therefore, exploitation of existing functional knowledge may fortify unlearning of unusable, dysfunctional knowledge in strategic renewal initiatives.

H2: Exploitation strengthens the inverted U-shaped relationship between unlearning and strategic renewal.

While internal factors influence how unlearning impacts strategic renewal, organizational unlearning may be affected by external factors as well. Environmental dynamism refers to the unpredictable rates of change in an industry (Dess & Beard, 1984). The stability or instability of an organization's environment has implications for rationality in decision-making processes, organizational strategy and capital structure, and economic performance (Hough & White, 2003; Priem, Rasheed, & Kotulic, 1995; Simerly & Li, 2000). Therefore, the rate of change in an organization's environment may further shape how knowledge divestment choices are made to support strategic renewal.

Faced with uncertainty amidst changing technological and economic circumstances, firms encounter a liability of obsolescence when misaligned with their environment (Barron, West, & Hannan, 1994; Frankel, 1955; Hannan, 2005). Environmental turbulence can be especially problematic as firms attempt to keep pace with incessant changes among their peers (Ranger-Moore, 1997; Sørensen & Stuart, 2000). As firms determine which skills and capabilities to incorporate into their renewed strategy and which ones to shed through unlearning, they may need to pay attention to

innovation rates among other firms in their environment. For example, Henderson (1999) found that firms retaining proprietary technologies in the U.S. personal computer industry experienced higher rates of sales growth—as well as higher rates of failure—than did their competitors forgoing proprietary knowledge for standards-based technologies.

Organizational learning depends on the rates at which adaptations take place; there may be fast learners and slow learners (Herriott, Levinthal, & March, 1985). In the same regard, organizational unlearning may occur at varying rates—some organizations will be quick to shed obsolete knowledge while others cling to ineffective strategies. In order to keep up with the competitive inertia of an industry, firms may need to align internal and external rates of change (Ben-Menahem et al., 2013; Miller & Chen, 1994). If the rate of change in an industry is fast-paced, then firms may be swiftly releasing knowledge. On the other hand, if the rate of change in an industry is more stable, unlearning may occur less briskly. However, if a firm seeks to change its strategic intent and capabilities through unlearning, it must divest inapplicable knowledge ahead of its peers in either case. Therefore, environmental dynamism may act as a catalyst to the relationship between unlearning and strategic renewal.

H3: Environmental dynamism strengthens the inverted U-shaped relationship between unlearning and strategic renewal.

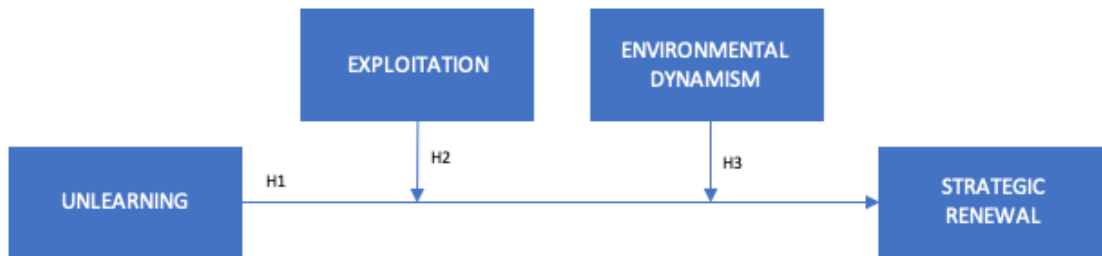


Figure 5: Organizational Unlearning and Strategic Renewal

Methodology

Data Sources and Sample

Similar to Study 1, core data on public firms in the United States was collected from PatentsView.org and CompuStat. PatentsView provides patent information from the U.S. Patent and Trademark Office dating back to 1975. CompuStat contains financial, statistical, and market information for companies dating back to 1962. According to the National Bureau of Economic Research, variance in intellectual property appropriability exists across industries; not all manufacturing firms protect innovation assets with patents, preferring secrecy, lead time advantages, and/or complementary marketing and manufacturing capabilities. Yet, for some industries, registered patents are pertinent for preventing rivals from copying technologies, inhibiting competitors from patenting related inventions, retaining leverage in negotiations, and legally protecting intellectual property (Cohen et al., 2000). Therefore,

I selected the communications equipment manufacturing industry in which firms are more likely to generate certified records of innovation by registering patents with the U.S. Patent and Trademark Office. The final sample included 163 public firms in SICs 3661, 3663, and 3669 with patenting activity between 1975 and 2020.

Dependent Variable

The dependent variable *strategic renewal* and was constructed in the same manner as Study 1. Strategic renewal is a measure of change in the firm's technological portfolio represented by the angular distance between the portfolio at time t and its previous portfolio at $(t-5)$. A period of five years was chosen based on qualitative and single-firm studies indicating that strategic renewal takes a period of at least several years (e.g., Agarwal & Helfat, 2009; Ben-Menahem et al., 2013; Crossan & Berdrow, 2003) as well as the average time of 25 months to get a patent approved according to the USPTO. The angle is calculated as $\theta = \cos^{-1}[(\mathbf{a} \times \mathbf{b}) / (||\mathbf{a}|| \times ||\mathbf{b}||)] = \cos^{-1}[(\mathbf{a}_1 \times \mathbf{b}_1 + \mathbf{a}_2 \times \mathbf{b}_2 + \dots + \mathbf{a}_k \times \mathbf{b}_k) / (||\sqrt{(\mathbf{a}_1^2 + \mathbf{a}_2^2 + \dots + \mathbf{a}_k^2)}|| \times ||\sqrt{(\mathbf{b}_1^2 + \mathbf{b}_2^2 + \dots + \mathbf{b}_k^2)}||)]$ where vector \mathbf{a} is the firm's technological position at time t and vector \mathbf{b} is the firm's technological position at time $(t-5)$ (Tzabbar, 2009). The angle is converted to a scalar technological distance between the firm at times t and $(t-5)$ in coordinate notation as $1 - P_{(t)(t-5)}$ where $P_{(t)(t-5)} = \Sigma F_t F_{t-5} / [\sqrt{\Sigma F_t^2} \sqrt{\Sigma F_{t-5}^2}]$. The vector F is represented by $(F_1 \dots F_k)$ where F_k is the proportion of patents assigned to class k in the previous five years, and the summations are of the coefficients from 1 to k (Jaffe, 1986, 1989; Vasudeva & Anand, 2011). The resulting strategic renewal measure ranges from a minimum value of 0 for no

changes to the technology portfolio to a maximum of 1 indicating that the firm completely changed its patent knowledge areas between times t and $(t-5)$. For angular distance values between 0 and 1, a higher number indicates that the sampled firm has taken a substantially different technological direction since the previous period while a lower number implies that the sampled firm has maintained a technological portfolio more consistent with its previously established path. Strategic renewal has a mean value of 0.381 with a standard deviation of 0.353.

Independent Variables

Patent class combinations have been used to represent knowledge elements in firm innovation (Basu et al., 2015; Howard et al., 2017) reflecting the recombinant nature of knowledge (Kaplan & Vakili, 2015; Kogut & Zander, 1992). Patents are categorized in a primary class with additional main classes and subclasses. The permutations of classes exemplify how innovative technology is developed through combining elements across multiple disciplines. As firms pursue new technological programs, they may abandon the use of certain elements that are no longer of value. Therefore, the independent variable *unlearning* measures recombinant knowledge that the firm has previously used but has since released. For each firm in each observation year, the U.S. patent classification (USPC) permutations were identified and compared to five years prior and five years following. Unlearning is the count of class combinations that no longer appear in the dataset for a period of ten years. This is a new operationalization of unlearning as prior empirical studies have used surveys and case

studies (e.g., Leal-Rodríguez et al., 2015; Snihur, 2018; Tsang, 2008). Observing abandonment of patent class combinations is consistent with recombinant views of knowledge development (Kaplan & Vakili, 2015; Kogut & Zander, 1992). Unlearning ranged from 0 to 1242 with a mean value of 8.29 and a standard deviation of 61.89.

The moderating variable *exploitation* is the number of patents attained by the firm using prior combinations during the five years prior to the observation year divided by the total number of patents in the prior five years. The exploitation measure represents the degree to which the firm reused existing knowledge per patent in the observation year. Exploitation ranged from 0 to 15.36 with a mean value of 0.55 and a standard deviation of 1.27. Environmental dynamism refers to the rate of change within the industry. Utilizing the method originated by Dess and Beard (1984) and propagated by strategic management research (Lepak, Takeuchi, & Snell, 2003; Richard, Wu, Markoczy, & Chung, 2019; Schilke, 2014), I calculate the moderating variable *environmental dynamism* by regressing time against industry revenues for the five years preceding each observation year. The standard error of the regression slope coefficient was used as the measure for environmental dynamism for each observation year. Environmental dynamism ranged from 2.06 to 5673.58 with a mean value of 830.02 and a standard deviation of 1303.72.

Control Variables

As with Study 1, I controlled for factors that may impact technology strategy and firm innovation in order to isolate the effects of explanatory variables. The ability of a

firm to change the composition of its knowledge base may be related to resources available. Therefore, I controlled for *R&D expenditures*, *ROA*, *firm age*, *number of inventors*, and *knowledge quality*. Research and development spending was taken from CompuStat and Mergent Online. Research and development spending ranged from \$0 to \$18,752M with a mean value of \$91.36M and a standard deviation of \$696.69M. Return on assets was calculated as net income divided by total assets, obtained from CompuStat and Mergent Online as well. ROA ranged from -\$99.92M to \$4.64M with a mean value of -\$0.20M and a standard deviation of \$2.05M. Firm age was calculated as the difference between the current year and the year the firm was founded. Founding years were obtained from multiple sources including Ritter IPO, Reference Solutions, Mergent Online, OpenCorporates.com, SEC.gov, and Google. Firm age ranged from 0 to 151 with a mean value of 23.28 and a standard deviation of 21.74. The number of inventors was captured from USPTO patent records by counting the number of active inventors on patents in each observation year. Number of inventors ranged from 0 to 3,469 with a mean value of 13.94 and a standard deviation of 127.49. Knowledge quality is the sum of external citations across all firm patents with patent application dates up to five years before the observation year (Lanjouw & Schankerman, 2004; Miller et al., 2007), reflecting the impact of the firm's innovation. Knowledge quality ranged from 0 to 15,162 with a mean value of 57.33 and a standard deviation of 572.37.

Analysis and Results

The continuous dependent variable was regressed on the independent variables using panel OLS in Stata 17. Table 4 shows the summary of variables for Study 2, and Table 5 shows the correlations for the dependent, independent, moderating, and control variables. The dependent variable strategic renewal was regressed on the independent and moderating variables and the variance inflation factors calculated as 1.01, 1.10, and 1.11 for unlearning, exploitation, and environmental dynamism, respectively. This indicates that there is no multicollinearity among the variables.

Table 4: Summary Table for Study 2

	Mean	SD	Min	Max
1. Strategic Renewal	0.38	0.35	0.00	1.00
2. Unlearning	0.66	1.15	0.00	1242.00
3. Exploitation	0.55	1.27	0.00	15.46
4. Environmental Dynamism	830.02	1303.72	2.06	5673.58
5. R&D Expenditures	91.36	696.69	0.00	18752.00
6. ROA	-0.20	2.05	-99.92	4.64
7. Firm Age	23.28	21.74	0.00	151.00
8. Number of Inventors	13.94	127.49	0.00	3469.00
9. Knowledge Quality	57.33	572.37	0.00	15162.00

Table 5: Correlation Table for Study 2

	1	2	3	4	5	6	7	8	9
1. Strategic Renewal	1.0000								
2. Unlearning	-0.1584*	1.0000							
3. Exploitation	-0.1189*	0.0460*	1.0000						
4. Environmental Dynamism	-0.1234*	0.0854*	0.2788*	1.0000					
5. R&D Expenditures	-0.1370*	0.3781*	0.0854*	0.1839*	1.0000				
6. ROA	-0.0005	0.0122	-0.0046	0.0046	0.0152	1.0000			
7. Firm Age	-0.0645*	0.3536*	0.0471*	0.1862*	0.1454*	0.0629*	1.0000		
8. Number of Inventors	-0.1620*	0.3877*	0.0593*	0.0895*	0.7401*	0.0183	0.1803*	1.0000	
9. Knowledge Quality	-0.1460*	0.4145*	0.0481*	0.0367*	0.4229*	0.0161	0.1900*	0.8176*	1.0000

* $p < .05$

Table 6 shows the results of the regression models. Model 1 regressed the dependent variable strategic renewal on the control variables research and development expenditures, return on assets, firm age, number of inventors, and knowledge quality. Model 2 provides the quadratic regression of strategic renewal on unlearning and the squared term of unlearning. The linear term is negative and significant ($\beta = -0.0009$, $p = 0.0100$) and the squared term is positive and significant ($\beta = 7.28E-07$, $p = 0.0120$) indicating a U-shaped curvilinear relationship. Hypothesis 1 predicted an inverted U-shape; thus, Hypothesis 1 is not supported. However, there is a significant relationship between unlearning and strategic renewal such that unlearning is negatively related to strategic renewal until an inflection point at which the relationship becomes positive. The relationship is a U-shaped curve.

Model 3 adds the moderator exploitation into the regression of strategic renewal on unlearning and unlearning squared. The effect is not significant ($p = 0.5700$), thus Hypothesis 2 is not supported. Model 4 adds the moderator environmental dynamism into the regression of strategic renewal on unlearning and unlearning squared. The

relationship between unlearning and strategic renewal is significant, but a U-shaped curve rather than the hypothesized inverted U-shape. The effects of the moderator environmental dynamism on the linear and square terms are significant ($p = 0.0030$ and $p=0.0140$) for the U-shaped curve. Hypothesis 3 is not supported since the relationship is not an inverted U-shape.

Table 6: Results for Study 2

	Model 1 (controls only)			Model 2			Model 3			Model 4		
	β	SE	p-value	β	SE	p-value	β	SE	p-value	β	SE	p-value
Independent Variable												
Unlearning				-0.0009	0.0004	0.0100	-0.0021	0.0006	0.0000	-0.0019	0.0005	0.0000
Unlearning Squared				7.28E-07	2.89E-07	0.0120	1.08E-06	5.63E-07	0.0560	1.68E-06	5.18E-07	0.0010
Moderating Variables												
Exploitation							-0.0637	0.0112	0.0000			
Exploitation X Unlearning							0.0006	0.0005	0.2120			
Exploitation X Unlearning Squared							4.51E-07	7.94E-07	0.5700			
Environmental Dynamism										0.0000	0.0000	0.0000
Environmental Dynamism X Unlearning										4.72E-07	1.57E-07	0.0030
Environmental Dynamism X Unlearning Squared										-4.35E-10	1.78E-10	0.0140
Control Variables												
R&D Expenditures	0.0000	0.0000	0.9920	4.08E-06	1.23E-05	0.7390	1.15E-05	1.26E-05	0.3640	5.99E-06	1.25E-05	0.6330
ROA	0.0046	0.0028	0.1020	0.0046	0.0028	0.1020	0.0046	0.0028	0.1000	0.0045	0.0028	0.1050
Firm Age	-0.0048	0.0009	0.0000	-0.0041	0.0010	0.0000	-0.0032	0.0010	0.0010	-0.0028	0.0010	0.0060
Number of Inventors	0.0000	0.0001	0.8900	-5.94E-06	6.64E-05	0.9290	-2.47E-05	6.60E-05	0.7080	-1.05E-05	6.70E-05	0.8760
Knowledge Quality	0.0000	0.0000	0.4500	-1.85E-06	1.21E-05	0.8790	1.49E-05	1.34E-05	0.2680	1.02E-05	1.37E-05	0.4590
Constant	0.5286	0.0308	0.0000	0.5169	0.0312	0.0000	0.5352	0.0316	0.0000	0.5399	0.0312	0.0000
R-Squared Within	0.0504			0.0464			0.0738			0.0528		
R-Squared Between	0.0206			0.0123			0.0005			0.0057		
R-Squared Overall	0.0017			0.0101			0.0204			0.0286		
Number of Observations	1434			1434			1434			1434		

Discussion

Organizational learning is an important aspect in a firm's pursuit of strategic renewal (Crossan & Berdrow, 2003; Crossan et al., 1999; Crossan et al., 2011), yet our research has neglected to investigate how the complementary phenomenon of *unlearning* may also contribute to the firm's redirection of its strategic intent and capabilities.

Through unlearning, firms deliberately release obsolete knowledge to create space for

new knowledge, improve efficiencies, and build organizational resilience (Hedberg, 1981; Morais-Storz & Nguyen, 2017; Tsang, 2017a; Tsang & Zahra, 2008). In this way, organizational unlearning supplements the learning processes necessary for strategic renewal.

Failing to recognize the significance of unlearning can result in the firm's underperformance or eventual demise. A leader in analogue photography, Kodak lagged in its transition to digital formats. Despite developing the first self-contained handheld digital camera in 1975, Kodak initially dropped the product out of fear that it would threaten its core film business. Though the company eventually became a top digital camera producer in the early 2000s, the commoditization of digital cameras had increased competition in the marketplace and provided low margins. Coupled with declining margins in film sales, Kodak filed for bankruptcy in 2012 but has since emerged and achieved some successes in image printing and software systems.

Similarly, Research In Motion (RIM) was initially a leader in the mobile handheld device market with its popular Blackberry product. Sales peaked in 2011 at \$20B, but the company faced decline ever since, reporting a mere \$1B in sales in 2020. RIM failed to adopt the dominant touchscreen design in mobile phones and was eclipsed by Apple and Android manufacturers. Even today, the company proposed a new Blackberry device in 2021 with a physical keyboard, unwilling to unlearn its previous technology. The device has yet to be released.

A final example is the brick-and-mortar business model that has been displaced by online retailers and digital service substitutes. Big box retailers such as JCPenney, Circuit City, and Borders Books failed to make the transition to provide sufficient online items and deals in addition to their storefronts. And, at-home movie rental giants Blockbuster and Hollywood Video desperately held on to physical locations despite the entertainment industry's shift toward digitized content, shared services, and electronic delivery. Had these companies unlearned their prior ways of doing business, they may have been able to survive today.

Though my original hypothesis of unlearning and strategic renewal having an inverted-U relationship was not supported, I found that the relationship is significant, yet takes on a U-shaped curve rather. Strategic renewal is high at low levels of unlearning, with further unlearning diminishing strategic renewal toward an inflection point at which higher levels of unlearning results in higher levels of strategic renewal. In the innovation context, the distance between the firm's technological knowledge portfolios at the beginning of the strategic renewal journey versus the end of the strategic renewal journey is greatest if the firm released little to no knowledge or very high amounts of knowledge. This finding has important theoretical and managerial implications.

Theoretical Implications

On the low end of unlearning, firms may achieve substantial changes in their technological portfolios through additive activities. Rather than allowing knowledge to become obsolete, firms may focus on building upon prior knowledge through

recombination (Fleming & Sorenson, 2001, 2004). This may be accomplished by creating modularity in the firm's products such that components complement foundational architectures that can be strengthened for a time rather than replaced (Christensen, 1992b; Christensen, 1992a; Tushman & Murmann, 1998). Additionally, firms may pursue acquisitions of complementary technologies that reinforce their existing portfolios and operations (Ahuja & Katila, 2001; Hitt, Hoskisson, Ireland, & Harrison, 1991; Vermeulen & Barkema, 2001). Future research in unlearning can explore how modularity and acquisitions impact strategic renewal endeavors.

On the high end of unlearning, the considerable difference in firm technological portfolios after strategic renewal may be a result of sufficient knowledge creation offsetting the disassociation from prior knowledge. In this way, firms exemplify the epitome of creative destruction (Schumpeter, 1934). The firm may have radically innovated its previous architectures and components such that the core concepts within the firm are overturned and replaced by breakthrough inventions (Ahuja & Katila, 2001; Henderson & Clark, 1990). Alternatively, firms may achieve considerable changes to their technological portfolios by dissolving or divesting unwanted business units (Hoskisson et al., 1994; Mitchell, 1994). Further research in how unlearning impacts strategic renewal can investigate the repercussions of revolutionary innovations and organizational divestitures.

Furthermore, external factors may impact how unlearning relates to strategic renewal. If the external environment is changing very rapidly, firms may need to adjust

more quickly. In highly dynamic environments, moderate unlearning offsets detrimental effects such that higher levels of strategic renewal can be achieved. If the external environment changes slowly, firms may have more time to utilize information and make decisions. However, in environments with low dynamism, moderate unlearning exacerbates detrimental effects such that lower levels of strategic renewal are achieved.

Managerial Implications

Ultimately, firm leadership must recognize the importance of managing the unlearning process during strategic renewal through bolstering prior knowledge or releasing it. On one hand, holding on to prior knowledge may reinforce strategic renewal activities if the firm can substantially change its knowledge base by building upon the knowledge and extending into new related areas. Managers must carefully discern what existing knowledge is helpful for redirecting the firm's strategy and how the firm can build upon that foundation effectively.

On the other hand, releasing extensive amounts of obsolete, ineffective, or misleading knowledge can contribute to strategic renewal as the firm pursues new avenues that displace previously successful strategies. Unlearning can contribute to the shift in the firm's knowledge portfolio. Management must pay close attention to the amounts and types of knowledge that is being released in order to substantially change the knowledge base within the firm to achieve successful strategic renewal.

Finally, managers should consider the impact of the external environment. In fast-paced industries, releasing misleading or obsolete knowledge allows the firm to

achieve higher levels of change in its strategic direction. In slow-paced industries, moderate levels of unlearning may prevent the firm from achieving its desired redirection whereas low or high levels of unlearning enable the change in strategic direction.

CHAPTER VI

STUDY 3: STRATEGIC RENEWAL AND ORGANIZATIONAL WISDOM

Organizational researchers have debated that strategic renewal results in either coalignment with the environment, purported by population ecologists and institutional theorists, or cocreation with the environment, as suggested by evolutionary theorists (Schmitt et al., 2018). Both of these outcomes examine the relationship between the organization and its environment, but I suggest that there is an internal outcome when organizations to alter their path dependence by transforming their strategic intent and capabilities—and that is, the organization gains *wisdom* through these successive transformations. Additionally, over time, the wisdom gained enables the organization to live even longer when reinjected as a learning and unlearning antecedent for the next iteration of strategic change. First, I review extant literature regarding organizational wisdom. Second, I hypothesize that when viewed through the lenses of knowledge and innovation, strategic renewal results in organizational wisdom. Third, I conduct an empirical examination of the relationship between strategic renewal, firm age, environmental dynamism, and organizational wisdom in a technology context using patent data from 163 public U.S. firms in the communications equipment manufacturing industry between 1975 and 2020.

Theory and Hypotheses

Organizational Wisdom

The Oxford Languages dictionary provides three definitions for *wisdom*: 1) the quality of having experience, knowledge, and good judgment; the quality of being wise; 2) the soundness of an action or decision with regard to the application of experience, knowledge, and good judgment; and 3) the body of knowledge and principles that develops within a specified society or period. Additionally, definitions of *wise* include: 1) having or showing experience, knowledge, and good judgment; 2) responding sensibly or shrewdly to a particular situation; and 3) having knowledge in a specified subject. Extending these definitions to an organization, we might say an organization has wisdom if it has experience, knowledge, and good judgment, is sound in its actions or decisions, and/or has developed knowledge in its industry. Of course, defining organizational wisdom (or a wise organization) is easier said than done. Scholars have wrestled with this concept for many years.

Early indications of the importance of wisdom in organizational research appear in *Academy of Management Review* and *Administrative Science Quarterly*. In their discussion of potential advantages of Japanese firms over Western rivals, Nonaka and Johansson (1985) suggest that development of hard skills (strategy, structure, and systems) may embody “accumulated organizational wisdom” (p. 191). Additionally, Smircich and Stubbart (1985) explicate how strategic management in enacted environments requires rethinking constraints, threats, and opportunities which can lead

to “industry wisdom” (p. 729) and learning and unlearning which may entail “organizational wisdom” (p. 732). Furthermore, Glynn (1996) relates innovation with organizational intelligence resulting from “accumulated wisdom” (p. 1088) and captured and stored “organizational wisdom” (p. 1092). Finally, Sutton and Hargadon (1996) examined how product design brainstorming groups at IDEO supported “an attitude of wisdom (acting with knowledge while doubting what one knows)” (p. 685).

As these prognostications suggest, a theoretical construct of wisdom at the organization level may be contentious—is organizational wisdom an aggregate of the individual wisdoms of constituents within, is it represented by executive management, or does it exist within the entity itself? While my intention is not to debate anthropomorphism, I contend that wisdom can live on within an organization long after any particular person or persons contribute to its mission but may be passed down through constituents. Organizations, unlike humans, have the potential for eternal viability—and retained organizational wisdom may be a key factor in their sustained existence. Drawing on philosophical tenets of Socrates, Plato, and Aristotle as well as psychological perspectives from by Kohut (1971), Meacham (1990), and Sternberg (1990, 1998, 2003, and 2005 with Jordan), organizational management scholars have published two books: *Organizational Wisdom and Executive Courage* (eds. Srivastva & Cooperrider, 1998) and *Handbook of Organizational and Managerial Wisdom* (eds. Kessler & Bailey, 2007). I review these discussions, incorporate journal research, and

extend organizational wisdom as a macro-level concept of the organization's experience, knowledge, and judgment.

Organizational Wisdom Definition

Prior research has defined organizational wisdom in relation to executives and management. In "Organizational Wisdom and Executive Courage", Srivastva and Cooperrider (1998) state that wisdom is "not a permanent trait but a dynamic process of subtle judging and knowing that must always be readjusted, restructured, and rebuilt." In the "Handbook of Organizational and Managerial Wisdom", Kessler and Bailey (2007) suggest that "The wise organization is characterized by institutionalized structure of checks and balances (logical); viability-enhancing leadership (ethical); behaviorally grounded change processes (aesthetic); accepting, empathic, and congruent understanding (epistemological); and a vision that inspires courage and hope to make a positive difference (metaphysical)." Additionally, Bierly, Kessler, and Christensen (2000) state in the Journal of Organizational Change Management that organizational wisdom "involves both the collection, transference and integration of individuals' wisdom and the use of institutional and social processes (e.g., structure, culture, routines) for storage. Putting these definitions together with the Oxford Dictionary's components, I define wisdom at the organization level as *a dynamic institutional and social process by which an entity has experience, knowledge, and sound judgment.*

Organizational Wisdom and Experience

Organizations exist for a particular purpose. Universities educate, governments regulate, and corporations produce. Through its breadth of processes, decisions, and outcomes, an organization accumulates experience in its area of concern. The accumulated experience lends to the organization's sensemaking of its environment, mission, and vision (Weick, 1995). Over time, a successful organization improvises as it faces challenges, learns, and continues to move forward (Crossan, Cunha, Vera, & Cunha, 2005). From a psychodynamic perspective, wisdom incorporates learning into a continuous construction and reconstruction of organizational identity (Brown & Starkey, 2000; Kohut, 1971). Essentially, the wise organization subsumes its experiential learning into an institutionalized structure of checks and balances, behaviorally-grounded change processes, and a courageous and hopeful vision for the future (Kessler & Bailey, 2007).

Organizational Wisdom and Knowledge

Organizational knowledge is a social construction of reality embedded in a tacit dimension (Berger & Luckmann, 1967; Polanyi, 1966). Knowledge is a key component of organizational wisdom, and wisdom may also be perceived as "meta-knowledge" or an awareness of the limitations of knowledge (Bigelow, 1992; Sternberg, 1998). Contemporary systems theorists support the idea that organizations are comprised of data, information, knowledge, and wisdom (Ackoff, 1989; Zeleny, 1987). Relating the "DIKW" hierarchy to Bloom's (1956) taxonomy of learning objectives, Bierly et al. (2000) outline that organizations accumulate raw facts (obtain data), give meaning to

obtained data (form information), analyze and synthesize derived information (create knowledge), and use knowledge to establish and achieve goals (exemplify wisdom). Ultimately, the wise organization creates knowledge while facing the ambiguity and uncertainty of the unknown (Rowley, 2006).

Organizational Wisdom and Judgment

The ability to act with knowledge while simultaneously doubting that knowledge promotes an attitude of wisdom (Meacham, 1990). This ambivalence may be the optimal compromise as organizations must carefully consider decisions and come to sensible conclusions each day (Weick, 1998). While an organization accumulates experiences and possesses knowledge, its wisdom is reflected in how it interprets its experiences and applies knowledge to make sound judgments. Through purposeful information processing, initiation of action, and implementation of innovation, an organization may continuously develop intelligence to adapt to environmental demands (Glynn, 1996). Ostensibly, the wise organization garners experience, knowledge, and sound judgment to courageously enact strategic changes for its survival (Srivastva & Cooperrider, 1998).

Strategic Renewal and Organizational Wisdom

Firms are often faced with stress when they recognize that their current strategy is unsatisfactory. To overcome inertial tendencies to continue pursuing this futile direction, the firm may engage in strategic renewal—significantly changing its intent and capabilities (Huff et al., 1992). Well known cases of successful strategic renewal can be seen in IBM's transformation from hardware to software and services (Agarwal &

Helfat, 2009) and Intel's refocusing from memory chips to microprocessors (Grove, 1997) while unsuccessful cases of strategic renewal may be observed from Xerox's missed opportunity in personal computing (Smith & Alexander, 1988) and Kodak's slow transition from film to digital photography (Benner & Tripsas, 2012). Anticipating changes in the marketplace and adjusting core strategies to continue attaining and maintaining competitive advantages are key to a firm's long-term viability. Through strategic renewal, a firm transforms its knowledge and skills, shifting away from unprofitable businesses to a potentially more secure future state.

When faced with ambiguity in pursuing a new strategic direction, firms must often choose between conflicting goals. For example, Levinthal and Rerup (2020) evaluated the contrasting imperatives of sales growth versus improved profit margins. When the outcome on one dimension exceeds aspirations, the firm's success may still be ambiguous. When the outcomes on both dimensions fall short of aspirations, the firm's success is what they call "unambiguous failure". When the outcomes on both dimensions exceed aspirations, the firm attains "unambiguous success". In all four quadrants, the firm can "embrace ambiguity through wisdom" (p. 10) in order to learn from the experience and move forward. In unambiguous success, the firm drills further and seeks additional improvement. In unambiguous failure, the firm learns from missteps and adjusts. When sales succeed and profits falter or vice versa, "The wisdom approach accepts the simultaneity of success and failure as strengths to be built on and problems to be solved" (Levinthal & Rerup, 2020: 11).

Thus, taking on an attitude of wisdom (Meacham, 1990; Weick, 1998) firms pursuing strategic renewal may view their activities as opportunities to gain experience, accrue knowledge, and learn sound judgment. Within the relational fabric of the organization, wise decision making may persist in the leadership, guidance, and actions of employees and managers (Gergen & Gergen, 1998; McNamee, 1998; Sampson, 1998). As the firm leverages collective knowledge, it can maximize effectiveness by discerning the most appropriate action for achieving value across multiple complex stakeholder relationships and uncertain situations (Bierly & Kolodinsky, 2007; Freeman, Dunham, & McVea, 2007). Achieving strategic change requires knowledge and action (Fukami, 2007). Through improving and properly orienting the innovative propensity of the organization to create new knowledge and release obsolete knowledge (De Meyer, 2007), the renewed firm may attain wisdom to renew itself again when necessary.

According to Kessler (2006: 296), “wisdom represents the synthesis of knowledge-based potential with higher order visioning and practical implementation”. In this way, the organization envisions its future state and pursues changes with strategic renewal. Based on organizational identity works of Albert and Whetten (1985) and Dutton and Dukerich (1991), Brown and Starkey (2000) suggest that organizations that overcome ego defenses of denial, rationalization, idealization, fantasy, and symbolization can change their identities. Fundamental to identity change is learning: “Once one embraces the identity of a learning organization, the organization accepts that identity formation is never closed and that it will develop a series of identities through

time that reflect the organization's and its members' evolving self-concepts" (p. 108), and wisdom: "Wise individuals and organizations shape and reshape identity through the ongoing construction/reconstruction of self" (p. 113). When a firm fundamentally changes the focused direction of its strategy, it gains wisdom from substantially changing its organizational identity. Therefore, I hypothesize:

H1: There is a positive relationship between strategic renewal and organizational wisdom.

Age can provide advantages and disadvantages to innovation as firms face the liabilities of newness, adolescence, or obsolescence (Henderson, 1999; Stinchcombe, 1965). Young firms may have technological agility but lack legitimacy in the marketplace while older firms have market experience but may be slower to adapt to technological changes (Sørensen & Stuart, 2000). Firms may have different goals as they progress through organizational life cycle stages (Chandler, 1962), and different processes and structures may encourage or inhibit innovation and strategic change (Bakker & Josefy, 2018). Newer firms engaging in strategic renewal may experience radical growth while older firms engaging in strategic renewal may receive incremental benefits to its established knowledge base.

Newer firms may have a dearth of organizational wisdom as they pursue strategic renewal. As they learn through experience, they can eventually differentiate between Aristotle's "technê" and "phronesis" dimensions of wisdom. Technê entails the knowledge of how to make a product well, whereas phronesis is a "cultivated disposition

towards excellence and self-perfection” that enables the firm to ‘know’ what a good product is (Nonaka, Chia, Holt, & Peltokorpi, 2014). Technê is a craft skill while phronesis is a virtue of engaged judgment (Shotter & Tsoukas, 2014). Thus, newer firms can only gain wisdom through more learning, more trial and error, and more strategic change. Ostensibly, older firms may have already developed both technê and phronesis and can apply their accumulated wisdom in successive strategic renewal endeavors. Therefore, the older a firm is, the more positive the relationship between strategic renewal and organizational wisdom.

H2: Firm age strengthens the positive relationship between strategic renewal and organizational wisdom.

Aside from firm age, external factors may impact how firms garner wisdom from strategic renewal. Environmental dynamism refers to the rate of change within an industry, absent of predictability and pattern (Dess & Beard, 1984). The variation in turbulence within a firm’s environment can influence managerial decision-making because of the speed with which they need to respond to changes and the timing and availability of information with which they need to base decisions upon (Hough & White, 2003; Priem et al., 1995). Environmental dynamism can affect organizational knowledge, dynamic capabilities, firm performance, and the attainment and sustenance of competitive advantages (Lepak et al., 2003; Schilke, 2014). Firms pursuing strategic renewal may achieve varying levels of organizational wisdom depending on the rate of change within the environment.

Cortez and Johnston (2019) suggest that firms cluster a specific set of knowledge, reaching an exceptional level of understanding about the market at that moment to capture value from innovation. Yet, as the environment changes, the firm’s understanding may no longer be applicable. Interpreting from Greek mythology, Mackay, Zundel, and Alkirwi (2014) describe the wisdom term “metis” as “situated resourcefulness”. In this way, firms only achieve wisdom with respect to current circumstances and must adjust with the environment. Firms competing in industries with slow rates of change may convert knowledge to wisdom more methodically while firms competing in fast-paced industries must understand and make wise decisions more quickly. In either case, firms engaging in strategic renewal activities need to achieve wisdom ahead of their peers. Therefore, environmental dynamism will have a positive effect on the wisdom accumulated from strategic renewal.

H3: Environmental dynamism strengthens the positive relationship between strategic renewal and organizational wisdom.



Figure 6: Strategic Renewal and Organizational Wisdom

Methodology

Data Sources and Sample

As with previous studies, core data on public firms in the United States was collected from PatentsView.org and CompuStat. PatentsView provides patent information from the U.S. Patent and Trademark Office dating back to 1975. CompuStat contains financial, statistical, and market information for companies dating back to 1962. According to the National Bureau of Economic Research, variance in intellectual property appropriability exists across industries; not all manufacturing firms protect innovation assets with patents, preferring secrecy, lead time advantages, and/or complementary marketing and manufacturing capabilities. Yet, for some industries, registered patents are pertinent for preventing rivals from copying technologies, inhibiting competitors from patenting related inventions, retaining leverage in negotiations, and legally protecting intellectual property (Cohen et al., 2000). Therefore, I selected the communications equipment manufacturing industry in which firms are more likely to generate certified records of innovation by registering patents with the U.S. Patent and Trademark Office. The final sample included 163 public firms in SICs 3661, 3663, and 3669 with a total of 76,208 patents between the years 1975 to 2020.

Dependent Variable

The dependent variable is *organizational wisdom*. A prevalent model of factors contributing to individual wisdom is the Berlin Wisdom Paradigm developed by

psychologist Paul Baltes and colleagues (Baltes & Kunzmann, 2004; Baltes & Smith, 2008; Baltes & Staudinger, 2000). The model outlines five criteria that define individual wisdom: 1) rich factual knowledge – conventional and definitive knowledge about the conditions of life and its variations, i.e. knowing about human nature and the life course; 2) rich procedural knowledge – conventional and definitive knowledge about strategies of judgement and advice concerning matters of life, i.e. knowing ways of dealing with problems in life; 3) lifespan contextualism – knowledge about the circumstances of life and their development over time, i.e. awareness and insight into how the many contexts of life relate to each other and change over the lifespan; 4) relativism – knowledge about differences in values, goals, and priorities, i.e. acknowledging differences between individuals, within society, and across cultures; 5) uncertainty – knowledge about the relative unpredictability and indeterminacy of life and ways to manage, i.e. knowing the limits of one’s own knowledge.

For technological strategic renewal, the inventors within the firm exemplify wisdom achieved through innovation as they have experienced cycles of ideation, conceptualization, feasibility, development, and invention registration. In this way, I captured the factors of the Berlin Wisdom Paradigm at an organizational level with inventor data from the USPTO record. For *rich factual knowledge (RFK)*, I created a firm-level measure of the average cumulative count of patents for each inventor in each observation year. The number of inventions per inventor exhibits the depth of general and specific technological knowledge for the firm. RFK ranged from 0 to 140 with a

mean value of 0.98 and standard deviation of 4.28. Additionally, technological development requires formulaic courses of action to ideate, experiment, test, and validate scientific research, and inventor collaboration encourages cross-learning among development teams. Therefore, for *rich procedural knowledge (RPK)*, I created a measure of the density of collaborative ties between inventors from an edge list of inventors working together on patents for each firm. The density of the network of inventors portrays the extent of collaboration within the firm that promotes a better understanding of general and specific technological development procedures. RPK ranged from 0 to 22,450 with a mean value of 40.15 and a standard deviation of 583.82.

As inventors experience more cycles of innovation, they acquire better understanding of the industry circumstances and conditions that contribute to technological development. Thus, *lifespan contextualism (LC)* was constructed by averaging the tenure of inventors in the firm through obtaining the time since the first invention by each inventor on record in the USPTO database. The tenure of an inventor was counted only in active observation years, i.e., the years each inventor patented. LC ranged from 0 to 37 with a mean value of 1.61 and a standard deviation of 3.90. Furthermore, inventors may have experienced different firms throughout their careers which contributes to a relative understanding of differences in values, goals, and priorities. Therefore, *relativism (REL)* was constructed by capturing the average number of firms each inventor of the focal firm had previously patented an invention. Again, the assignee count for each inventor was only counted in years when the inventor actively

patented. REL ranged from 0 to 25 with a mean value of 0.53 and a standard deviation of 1.17.

Finally, *uncertainty (UNC)* is based on a previous measure developed by Howard et al. (2017). For each inventor in the focal firm, I captured the primary technological category in which the inventor patents, designated by the USPC code. For each of the primary technological categories, I identified the first patent in the entire USPTO record to establish the age of the knowledge area by subtracting the first year of patenting from the current year. Aggregating this to a firm level, I calculated an average age of core knowledge areas across inventors. The resulting measure represents lower uncertainty for older technologies and higher uncertainty for newer technologies, consistent with uncertainty precedents set by Oriani and Sobrero (2008). Inventors working with older technologies have more knowledge about relative unpredictability and indeterminacy than those working with newer technologies. UNC ranged from 0 to 1,008 with a mean value of 13.62 and a standard deviation of 40.28.

Using confirmatory factor analysis, I determined how the five facets of the Berlin Wisdom Model load with each other to represent variation in the latent variable *wisdom*. Using principal component factors on 7,452 observations in Stata 17.0, the unrotated correlation resulted an eigenvalue of 2.53394 loading on one factor which explained 50.68% of the total variance with an LR test of independent versus saturated $\chi^2(10) = 0.00013$ and p-value of 0.000. The analysis retained one factor with loadings and unique variances for each parameter: RFK (0.6421, 0.5877), RPK (0.2122, 0.9550), LC (0.9087,

0.1744), REL (0.8871, 0.2130), and UNC (0.6812, 0.5360). A regression scoring based on varimax rotated factors was used to predict the single factor *wisdom*. Scoring coefficients were: RFK (0.25339), RPK (0.08376), LC (0.35859), REL (0.35010), and UNC (0.26882). *Wisdom* ranges from 0 to 10.47 with a mean value of 1.45 and a standard deviation of 1.18.

Independent Variables

The independent variable is *strategic renewal*, constructed in the same manner as the previous two studies. Strategic renewal is a measure of change in the firm's technological portfolio represented by the angular distance between the portfolio at time t and its previous portfolio at $(t-5)$. A period of five years was chosen based on qualitative and single-firm studies indicating that strategic renewal takes a period of at least several years (e.g., Agarwal & Helfat, 2009; Ben-Menahem et al., 2013; Crossan & Berdrow, 2003) as well as the average time of 25 months to get a patent approved according to the USPTO. The angle was calculated as $\theta = \cos^{-1}[(\mathbf{a} \times \mathbf{b}) / (||\mathbf{a}|| \times ||\mathbf{b}||)] = \cos^{-1}[(\mathbf{a}_1 \times \mathbf{b}_1 + \mathbf{a}_2 \times \mathbf{b}_2 + \dots + \mathbf{a}_k \times \mathbf{b}_k) / (||\sqrt{(\mathbf{a}_1^2 + \mathbf{a}_2^2 + \dots + \mathbf{a}_k^2)}|| \times ||\sqrt{(\mathbf{b}_1^2 + \mathbf{b}_2^2 + \dots + \mathbf{b}_k^2)}||]$ where vector \mathbf{a} is the firm's technological position at time t and vector \mathbf{b} is the firm's technological position at time $(t-5)$ (Tzabbar, 2009). The angle was converted to a scalar technological distance between the firm at times t and $(t-5)$ in coordinate notation as $1 - P_{(t)(t-5)}$ where $P_{(t)(t-5)} = \Sigma F_t F_{t-5} / [\sqrt{\Sigma F_t^2} \sqrt{\Sigma F_{t-5}^2}]$. The vector F is represented by $(F_1 \dots F_k)$ where F_k is the proportion of patents assigned to class k in the previous five years, and the summations are of the coefficients from 1 to k (Jaffe, 1986, 1989;

Vasudeva & Anand, 2011). The resulting strategic renewal measure ranged from a minimum value of 0 for no changes to the technology portfolio to a maximum of 1 indicating that the firm completely changed its patent knowledge areas between times t and $(t-5)$. For angular distance values between 0 and 1, a higher number indicates that the sampled firm has taken a substantially different technological direction since the previous period while a lower number implies that the sampled firm has maintained a technological portfolio more consistent with its previously established path. The mean value of *strategic renewal* was 0.38 with a standard deviation of 0.35.

The moderating variables are *firm age* and *environmental dynamism*. Firm age was calculated as the difference between the current year and the year the firm was founded. Founding years were obtained from multiple sources including Ritter IPO, Reference Solutions, Mergent Online, OpenCorporates.com, SEC.gov, and Google. Firm age ranged from 0 to 151 with a mean value of 23.28 and a standard deviation of 21.74. Environmental dynamism refers to the rate of change within the industry and was constructed similar to the previous study. Utilizing the method originated by Dess and Beard (1984) and propagated by strategic management research (Lepak et al., 2003; Richard et al., 2019; Schilke, 2014), I calculated the moderating variable *environmental dynamism* by regressing time against industry revenues for the five years preceding each observation year. The standard error of the regression slope coefficient was used as the measure for environmental dynamism for each observation year. Environmental

dynamism ranged from 2.06 to 5673.58 with a mean value of 830.02 and a standard deviation of 1303.72.

Control Variables

As with previous studies, I controlled for factors that may impact technology strategy and firm innovation in order to isolate the effects of explanatory variables. The wisdom accrued by a firm may be related to resources available. Therefore, I controlled for *R&D expenditures*, *ROA*, *number of inventors*, and *knowledge quality*. Research and development spending was taken from CompuStat and Mergent Online. Research and development spending ranged from \$0 to \$18,752M with a mean value of \$91.36M and a standard deviation of \$696.69M. Return on assets was calculated as net income divided by total assets, obtained from CompuStat and Mergent Online as well. ROA ranged from -\$0.20M to \$2.05M with a mean value of -\$99.92M and a standard deviation of \$4.64M. The number of inventors was captured from USPTO patent records by counting the number of active inventors on patents in each observation year. Number of inventors ranged from 0 to 3,469 with a mean value of 13.94 and a standard deviation of 127.49. Knowledge quality is the sum of external citations across all firm patents with patent application dates up to five years before the observation year (Lanjouw & Schankerman, 2004; Miller et al., 2007), reflecting the impact of the firm's innovation. Knowledge quality ranged from 0 to 15,162 with a mean value of 57.33 and a standard deviation of 572.37.

Analysis and Results

The analysis was performed in Stata 17 using panel OLS. Table 7 shows the summary of variables in Study 3, and Table 8 shows the correlations for the dependent, independent, moderating, and control variables. Regressing the dependent variable wisdom on the independent and moderating variables, the variance inflation factors are 1.02, 1.01, and 1.01 for strategic renewal, firm age, and environmental dynamism, respectively. No multicollinearity between variables exists.

Table 7: Summary Table for Study 3

	Mean	SD	Min	Max
1. Organizational Wisdom	1.45	1.18	0.01	10.47
2. Strategic Renewal	0.38	0.35	0.00	1.00
3. Firm Age	23.28	21.74	0.00	151.00
4. Environmental Dynamism	830.02	1303.72	2.06	5673.58
5. R&D Expenditures	91.36	696.69	0.00	18752.00
6. ROA	-0.20	2.05	-99.92	4.64
7. Number of Inventors	13.94	127.49	0.00	3469.00
8. Knowledge Quality	57.33	572.37	0.00	15162.00

Table 8: Correlation Table for Study 3

	1	2	3	4	5	6	7	8
1. Organizational Wisdom	1.0000							
2. Strategic Renewal	-0.1094*	1.0000						
3. Firm Age	0.1735*	-0.0645*	1.0000					
4. Environmental Dynamism	0.3809*	-0.1234*	0.1862*	1.0000				
5. R&D Expenditures	0.2060*	-0.1370*	0.1454*	0.1839*	1.0000			
6. ROA	-0.0519	-0.0005	0.0629*	0.0046	0.0152	1.0000		
7. Number of Inventors	0.1549*	-0.1620*	0.1803*	0.0895*	0.7401*	0.0183	1.0000	
8. Knowledge Quality	0.0602*	-0.1460*	0.1900*	0.0367*	0.4229*	0.0161	0.8176*	1.0000

* $p < .05$

Tables 9 and 10 show the regression results. Model 1 provides the regression of wisdom on the control variables only. Model 2 regressed the dependent variable wisdom on the independent variable strategic renewal. The relationship is negative and significant ($\beta = -0.6731$, $p = 0.000$). Hypothesis 1 predicted that the relationship between strategic renewal and wisdom would be positive, and the result is the inverse. Hypothesis 1 is not supported. Rather than a unit change in strategic renewal resulting in an effective positive change in organizational wisdom, a unit change in strategic renewal results in an effective negative change in organizational wisdom. Although the positive direct effect was not supported, I tested the moderators firm age and environmental dynamism on the linear negative effect. Model 3 shows that the moderating effect of firm age on the relationship between strategic renewal and wisdom is not significant ($p = 0.319$). Model 4 shows that the moderating effect of environmental dynamism on the relationship between strategic renewal and wisdom is not significant ($p = 0.085$). Hypotheses 2 and 3 are not supported.

Table 9: Linear Relationship for Study 3

	Model 1 (controls only)			Model 2			Model 3			Model 4		
	β	SE	p-value	β	SE	p-value	β	SE	p-value	β	SE	p-value
Independent Variable												
Strategic Renewal				-0.6731	0.1173	0.000	-0.4193	0.1975	0.034	-0.2878	0.1407	0.041
Moderating Variables												
Firm Age							0.0285	0.0043	0.000			
Firm Age X Strategic Renewal							-0.0065	0.0065	0.319			
Environmental Dynamism										0.0004	0.0000	0.000
Environmental Dynamism X Strategic Renewal										-0.0001	0.0001	0.085
Control Variables												
R&D Expenditures	0.0001	4.18E-05	0.000	0.0001	4.32E-05	0.003	0.0001	4.16E-05	0.036	0.0001	4.14E-05	0.150
ROA	-0.0530	0.0483	0.273	-0.1395	0.0751	0.063	-0.1568	0.0756	0.038	-0.1036	0.0689	0.132
Number of Inventors	0.0010	0.0002	0.000	0.0010	2.41E-04	0.000	0.0009	0.0002	0.000	0.0007	0.0002	0.002
Knowledge Quality	-0.0001	4.15E-05	0.055	-0.0001	4.32E-05	0.022	-0.0001	4.12E-05	0.030	0.0000	4.14E-05	0.385
Constant	1.2391	0.0572	0.000	1.6716	0.0812	0.000	0.9922	0.1330	0.000	1.1401	0.0870	0.000
R-Squared Within	0.0881			0.1471			0.2565			0.2341		
R-Squared Between	0.0148			0.0243			0.0001			0.2269		
R-Squared Overall	0.0509			0.0662			0.0394			0.2119		
Number of Observations	1398			982			982			982		

Exploratory Analysis

I further investigated the relationship between strategic renewal and wisdom by introducing the squared term of strategic renewal. Table 10 shows the regression results. Model 5 shows that the linear term is negative ($\beta = -1.6805$, $p = 0.000$) and the quadratic term is positive ($\beta = 1.033$, $p = 0.011$); this provides evidence that a curvilinear relationship exists between strategic renewal and organizational wisdom. Model 6 adds the moderator firm age; the moderating effect of firm age on the curvilinear relationship between strategic renewal and organizational wisdom is not significant ($p = 0.595$). Model 7 adds the moderator environmental dynamism; the moderating effect of environmental dynamism on the curvilinear relationship between strategic renewal and organizational wisdom is not significant ($p = 0.244$). Figure 8 graphs the curvilinear relationship between strategic renewal and organizational wisdom showing a U-shape.

Table 10: Curvilinear Regression Results for Study 3

	Model 5			Model 6			Model 7		
	β	SE	p-value	β	SE	p-value	β	SE	p-value
Independent Variable									
Strategic Renewal	-1.6805	0.4120	0.000	-1.5208	0.7282	0.037	-1.3719	0.5014	0.006
Strategic Renewal Squared	1.033	0.4043	0.011	1.1126	0.7055	0.115	1.1048	0.4934	0.025
Moderating Variables									
Firm Age				0.0259	0.0050	0.000			
Firm Age X Strategic Renewal				0.0069	0.0257	0.789			
Firm Age X Strategic Renewal Squared				-0.0132	0.0248	0.595			
Environmental Dynamism							0.0003	0.0000	0.000
Environmental Dynamism X Strategic Renewal							0.0002	0.0003	0.496
Environmental Dynamism X Strategic Renewal Squared							-0.0004	0.0003	0.244
Control Variables									
R&D Expenditures	0.0001	4.31E-05	0.004	0.0001	4.17E-05	0.038	0.0001	4.14E-05	0.147
ROA	-0.1337	0.0747	0.073	-0.1495	0.0754	0.047	-0.0984	0.0688	0.153
Number of Inventors	0.0010	2.41E-04	0.000	0.0009	0.0002	0.000	0.0007	0.0002	0.002
Knowledge Quality	-0.0001	4.32E-05	0.015	-0.0001	4.13E-05	0.024	0.0000	4.15E-05	0.285
Constant	1.7888	0.0926	0.000	1.1467	0.1559	0.000	1.2654	0.1032	0.000
R-Squared Within	0.1615			0.2624			0.2434		
R-Squared Between	0.0076			0.0004			0.2041		
R-Squared Overall	0.0594			0.0379			0.2091		
Number of Observations	982			982			982		

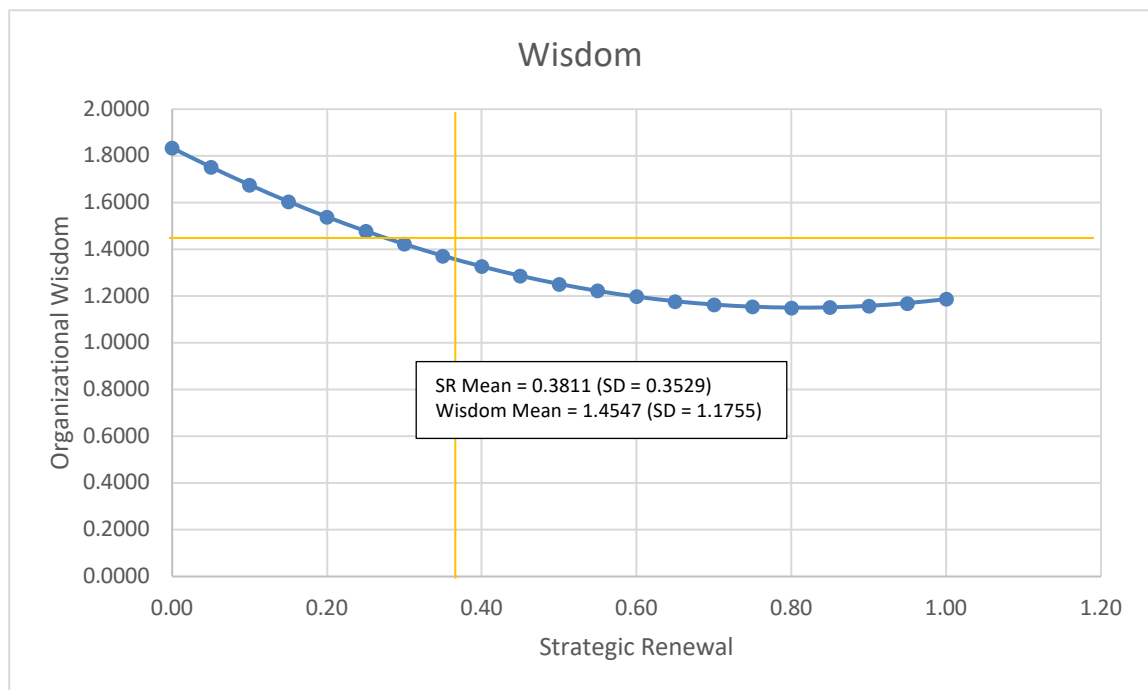


Figure 7: Curvilinear Relationship between Strategic Renewal and Organizational Wisdom

Discussion

In 1995, Nonaka and Takeuchi published their influential book The Knowledge Creating Company: How Japanese Companies Create the Dynamic of Innovation, stressing the importance of tacit knowledge—the intelligence gained through experience, insight, and intuition. Following up with a sequel twenty-four years later in 2019, Nonaka and Takeuchi published The Wise Company: How Companies Create Continuous Innovation. Observing the fundamental challenge of high-velocity change facing companies today, the authors emphasize a relentless self-renewal process in which companies ceaselessly and repeatedly create knowledge, disseminate it throughout the organization, and convert knowledge to action over time. Conveyed in stories and metaphors in the tacit dimension, practical wisdom is infused in the organization to guide strategies, decisions, and initiatives. In this way, firms realize the future they envision rather than merely responding to changes in the environment (Nonaka & Takeuchi, 2019).

Thus, firms procure wisdom through continuous innovation—learning through constant creating, experimenting, testing, deploying, succeeding, and potentially failing. It is through these trials and tribulations that the firm gains proficiencies as it extracts knowledge from experience and learns sound judgment. With each lesson, the organization becomes adept at applying pertinent knowledge in particular circumstances. As Bierly et al. (2000: 597) suggest, organizational wisdom is “the judgment, selection

and use of specific knowledge for a specific context” that relates to “the ability to effectively choose and apply the appropriate knowledge in a given situation”.

When a firm recognizes the ineffectiveness of its current strategy, it may endeavor on a journey of strategic renewal—the process that allows the firm to alter its path dependence by transforming its strategic intent and capabilities (Huff et al., 1992; Schmitt et al., 2018). The transformation results in a new strategic direction for the firm that has the potential to determine its long-term competitiveness (Sammut-Bonnici & McGee, 2014). In this study, I argue that the innovation involved in strategic renewal results in generating wisdom for the firm as the firm learns what does and does not work during its transformation. The results of my study have important theoretical and managerial implications.

Theoretical Implications

Though my original hypotheses were not supported, I contribute to organizational management literature in three ways. First, I establish organizational wisdom as a significant outcome of strategic renewal. As firms transform their strategic intent and capabilities through innovation, they acquire experience, knowledge, and judgment. The firm is enriched with factual and procedural knowledge—gaining new understanding of its business and how to make appropriate decisions. Strategic renewal provides awareness about how the firm handles change and insights about different values, goals, and priorities. The activities of strategic renewal test the limits of the

firm's knowledge—it must approach change with an attitude of wisdom, moving forward despite unpredictability, indeterminacy, and uncertainty.

The significant relationships between strategic renewal and organizational wisdom were two-fold—a negative linear relationship and a U-shaped curve. As the distance between the firm's technological portfolio at the beginning of strategic renewal and the end of strategic renewal increases, the level of organizational wisdom generated decreases. This may be due to competence-destroying nature of technological discontinuities (Anderson & Tushman, 1990). A firm that has maintained a similar technological knowledge portfolio can extract greater levels of wisdom from added depth in the same area while a firm that has made a 180-degree shift in its technological portfolio has depleted some of its previous expertise. However, the U-shaped relationship suggests that the decline in organizational wisdom obtained from strategic renewal reaches an inflection point—at a moderate distance from the firm's original knowledge portfolio, wisdom obtained is the lowest. This may exemplify a point of “complexity catastrophe” (Fleming & Sorenson, 2001) where the firm has depleted competencies in previous areas of expertise and is still building up aptitudes in new areas.

Managerial Implications

Though much has been written about the wisdom of firm leadership (e.g., Kessler & Bailey, 2007; Srivastva & Cooperrider, 1998), organizational wisdom is a firm-level construct that exists in the relational fabric of the firm. Managers should be aware of the

existence of organizational wisdom as well as the potential to generate wisdom from endeavoring in strategic changes. As the firm redirects its intent and capabilities through innovation, managers can capitalize on the experience, knowledge, and sound judgment that infuses throughout the firm. Strategic renewal activities provide factual knowledge about the nature of doing business and variations available to the firm as well as procedural knowledge about how to make sound decisions and handle problems that arise. By engaging in strategic renewal, the firm gains new insights about the context in which it operates and how circumstances develop over time. The knowledge base of the firm also absorbs lessons about relative experiences and uncertainties involved with transforming the business. Managers of firms must acknowledge that strategic renewal is a learning journey in which the knowledge portfolio changes but that the organizational wisdom extracted is the ultimate reward.

CHAPTER VII

CONCLUSIONS

To summarize, strategic renewal is an important phenomenon in the lifecycle of a firm or organization. By undertaking activities to change the strategic intent and capabilities, the firm or organization can redirect its path to secure future viability. I contribute to strategic renewal research in three important ways. First, the relationship between organizational learning and strategic renewal has been established in management literature through qualitative assessments (e.g., Crossan & Berdrow, 2003; Crossan et al., 1999; Crossan et al., 2011; Jones & Macpherson, 2006; Pettit & Crossan, 2020), yet we have limited understanding of how firms vary in their learning activities during strategic renewal. Therefore, I extend our theorization of organizational learning and strategic renewal by applying exploration and exploitation concepts in the technology domain to capture how multiple firms change technological knowledge to remain viable in the industry.

Second, scholars have theorized about the importance of unlearning obsolete knowledge to persist through ever-changing circumstances (see Bettis & Prahalad, 1995; Hedberg, 1981; Huber, 1991; Starbuck, 2017; Tsang, 2017a; Tsang & Zahra, 2008), yet we have not identified exactly how unlearning impacts the knowledge base of the firm and subsequent strategic change. Thus, Study 2 explored how unlearning plays a substantial role in the modification of firm knowledge during strategic renewal activities by releasing obsolete knowledge that does not contribute to the new technological

direction. The study exemplifies how unlearning can play a meaningful role in the transformation of a firm's technological strategy when also taking into account exploitation of current technologies and dynamics within the environment.

Finally, strategic renewal research has identified co-alignment and co-evolutionary consequences when firms change their strategic intent and capabilities (e.g., Agarwal & Helfat, 2009; Flier et al., 2003; Jones & Macpherson, 2006; Kim & Pennings, 2009), but scholars have not identified the mechanisms that contribute to these outcomes. Therefore, in Study 3, I examined how organizational wisdom results from firms pursuing strategic renewal activities and when moderated by age and environmental dynamism across the large sample from the communications industry. From these three studies, we gained insights into exactly *what* organizations strategically renew—knowledge—and *how* organizations accomplish strategic renewal—innovation.

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